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TRANSACTIONS

OF THE

ACADEMY OF SURGERY

OF

PHILADELPHIA.

VOLUME I.

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TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, February 7, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

A CASE OF HARA-KIRI WHICH TERMINATED IN RECOVERY.

BY RICHARD H. HARTE, M.D.,

SURGEON TO THE PENNSYLVANIA AND TO THE EPISCOPAL HOSPITALS.

THE case herewith reported illustrates almost perfectly the horrible act of self-destruction called hara-kiri, which has been practised by the Japanese *Samurai*, or gentlemen of the military class, for centuries; and than which probably nothing shows more strongly the force of education. The *Samurai* from his earliest years is taught to look on hara-kiri as a ceremony in which he may be called to play a part as principal or second. In the families which cling to the traditions of ancient chivalry the child is instructed in the rite and familiarized with the idea as an honorable expiation of crime and blotting out of disgrace. If the hour comes, he is prepared for it, and bravely faces the ordeal which early training has robbed of half its terrors.

The ceremonies observed at hara-kiri are many; and the greatest consideration is shown for the feelings of the principal. None but his friends and the high officers of the court are permitted to be present. For a long time after the revolt against the Tycoon the rite was a daily occurrence in the prison at Yeddo. The victim is placed on a low platform, or *jisaiba*. This is surrounded by a canvas screen, for

none of the lower grade officers in attendance are permitted to be spectators. The condemned man is attired in the dress of ceremony, wearing his wings of hempen cloth. He is seated on a rug in the Japanese position, with two *kaishaku* on either side. The *kaishaku* on the left side announces his name and surname, and says, bowing, "I have the honor to act as *kaishaku* to you. Have you any last wish to confide to me?" The condemned man accepts the offer or not, as the case may be. He then bows to the sheriff, and a dirk, nine and a half inches long, wrapped in white paper, is placed on a stand such as is used for offerings in temples. He takes the dirk and stabs himself on the left side below the navel, drawing the knife across to the right side. As he falls forward, the *kaishaku* on the left side cuts off his head with a single stroke of his sword. The *kaishaku* on the right takes up the head and shows it to the sheriff. The body is then given to the friends for burial. In most cases the property of the deceased is confiscated.

The ceremony observed at hara-kiri appears to vary slightly in detail in different parts of Japan. In all cases, however, where the criminal disembowels himself without condemnation and without investigation, the offence is considered not proven, and the property is not confiscated, because he is no longer able to defend himself.

The following graphic description of the ceremony, as witnessed by Mr. Milford, Secretary to His Majesty's Legation, Japan, serves to illustrate the pomp and ceremony observed on the occasion:

"The ceremony, which was ordered by the Mikado himself, took place at 10.30 o'clock at night in the temple of Seigukuji, the head-quarters of the Satsuma troops at Hiogo. The victim had been convicted of ordering the troops to fire on the foreigners at Kôbê. A witness was sent from each of the foreign legations,—seven in all. After some little delay, the guests were invited to follow the Japanese officers into the main hall of the temple, where the ceremony was to be performed. From the high ceiling hung

a profusion of large gilt lamps and ornaments peculiar to Buddhist temples. In front of a high altar the floor was covered with beautiful white mats; on a low platform, raised three or four inches from the ground, was laid a rug of scarlet felt. Tall candles placed at regular intervals shed a dim, misty light, just sufficient to let all the proceedings be seen. The seven Japanese took their places on the left of the raised floor and the seven foreigners on the right.

"After a few minutes of delay, a stalwart man, thirty-two years of age, with a noble air, walked into the hall, attired in his dress of ceremony, with the hempen cloth wings which are worn on great occasions. He was accompanied by a *kaishaku* and three officers. (The office of *kaishaku*, or executioner, is that of a gentleman, and is in many cases performed by a kinsman or friend of the condemned man; and the relation between them is rather that of principal and second than that of victim and executioner. In this instance the *kaishaku* was a pupil of the victim, and was selected by his friends from among their own number for his skill in swordmanship.) With the *kaishaku* on his left, the condemned man advanced slowly towards the Japanese witnesses, and the two bowed before them. Then drawing near to the foreigners, they saluted in the same way. Slowly, and with great dignity, the victim mounted the raised floor, prostrated himself before the altar twice, and seated himself in the Japanese fashion (knees and toes touching the ground, and the body resting on the heels,—always a position of respect) on the felt carpet, with his back to the altar and the *kaishaku* crouching at his left side. One of the three attendant officers came forward bearing a stand of the kind used in temples for offerings, on which, wrapped in paper, lay the short sword, or dirk, of the Japanese, with a point and edge sharp as a razor. This he handed, prostrating himself, to the condemned man, who received it reverently, raising it to his head with both hands, and placed it in front of himself. After another obeisance, he said, in a clear voice, betraying no sign of fear or emotion, 'I, and I alone, un-

warrantedly gave the order to fire on the foreigners at Kôbê, and again as they tried to escape. For this crime I disembowel myself. I beg you who are present to do me the honor of witnessing the act.'

"Bowing once more, he permitted his garments to slip to his girdle and remained naked to the waist. Carefullv, according to the custom, he tucked his sleeve under his knee to prevent himself from falling backward, for a noble Japanese gentleman should die falling forward. Deliberately, and with a steady hand, he took the dirk that lay before him, and looking at it wistfully, almost affectionately, for a moment, he seemed to collect his thoughts for the last time; then stabbing himself deeply below the waist on the left side, he drew it slowly across to the right side, and turning the knife in the wound, he gave a slight cut upward. During this operation he never moved a muscle of his face. Finally, drawing out the dirk, he leaned forward and stretched out his neck. At that moment the *kaishaku*, still crouching by his side, sprang to his feet, poised his sword for a second in the air, and with one blow the head was severed from the body. The *kaishaku* in dead silence made a low bow, wiped his sword, and retired from the raised floor. The stained dirk was solemnly borne away as proof of the execution."

There are many records of the extraordinary heroism displayed in hara-kiri. When, for example, the Tycoon, defeated and determined to fight no more but to yield everything, had fled to Yeddo, a member of his council came to him and said, "Sir, the only way in which you can now retain (?) the honor of the family of Tokugewa is to disembowel yourself. To prove to you that I am sincere and disinterested in what I say, I am here, ready to disembowel myself with you." The Tycoon, flying into a rage, said that he would listen to no such nonsense and left the room. But his faithful follower, to prove his honesty, thereupon retired to another part of the castle and solemnly performed the hara-kiri.

Three months before his admission to the Pennsylvania

Hospital, Henry H., aged forty years, butcher by occupation, because of the loss of eyesight, became very depressed, so that his friends became apprehensive about him, and rarely permitted him to remain alone. He succeeded, however, in stealing a small butcher's knife from the block, concealed it in his clothing, and walked quietly into the yard, where he deliberately thrust the knife into his abdomen on the left side, and drew it across to a corresponding point on the opposite side, severing all the parietal integument and allowing a large amount of the viscera to escape. He was presently discovered standing in the yard holding a large loop of intestine in his hand, which he exhibited with a tragic air, asking, "What do you think of that?" He was immediately seized by two men, placed in the bottom of an express wagon which was standing in front of the house, and driven to the Pennsylvania Hospital. No time was lost in sending for the attending surgeon, as I happened to be in the Receiving Ward on his arrival. While an anæsthetic was being administered, his clothing was removed, and the protruding mass of bowels was kept covered with hot, wet towels. After the patient was prepared so that a careful examination could be made, it was found that a large transverse wound, eight to nine inches in length, had been made in the abdominal wall, on a line just above the umbilicus, the knife having entered a point corresponding to the left nipple-line and passed across to a corresponding point in the opposite side. From the wound were found protruding the transverse colon, omentum, and a large mass of small intestines, a portion of which, about fifteen inches in length, had been severed from its mesenteric attachment and stripped of its peritoneal covering. In addition to this mutilation, the entire protruding mass of intestine had become soiled from contact with clothing and dust from the bottom of the wagon in which the patient had been conveyed. In order to control the hæmorrhage, the wound was enlarged by an incision in the median line, which enabled me to remove some clots and secure some large mesenteric branches which were bleeding

within the abdominal cavity. After a thorough cleansing with hot distilled water, the intestinal mass was replaced within the abdomen, with the exception of that part of the ileum which had been severed from its mesenteric attachment. About eighteen inches of this injured bowel were resected, care being taken to excise well within the edge of healthy omentum and uninjured intestine, so that the bowel could be accurately approximated, which was done by means of Murphy's button, making an end-to-end anastomosis. The edge of the cut mesentery was accurately approximated on both sides with continuous catgut sutures. During the manipulation all exposed portions of the intestine were protected with towels, which were kept wet with hot sterile water. After another thorough douching and washing out of the abdomen with hot water the abdomen was closed, first by the introduction into the peritoneum of a continuous catgut suture, after which deep retaining stitches of silkworm gut were passed through all integument down to the peritoneum. These were left intact until all the other planes of tissue were accurately approximated with catgut sutures. Lastly, the deep retaining stitches were tied, thus giving much additional support to the wound. Just before the final closing of the wound a "two-way" glass drainage-tube was introduced into the lower part of the vertical incision. The usual antiseptic dressing was applied.

The patient's condition during the operation was fairly good, showing little evidence of shock. The after-treatment varied little from the usual methods pursued in dealing with abdominal operations, by the withdrawal of all food, depending for the first forty-eight hours entirely upon rectal alimentation; then the administration of small quantities of peptonized milk by the mouth, in drachm doses. The tube was flushed hourly for the first day, and afterwards every two hours. It was removed on the second day at the dressing of the wound, which was perfectly clean. On the fourth day the patient had four slight bowel movements.

On the seventh day the wound and temperature showed

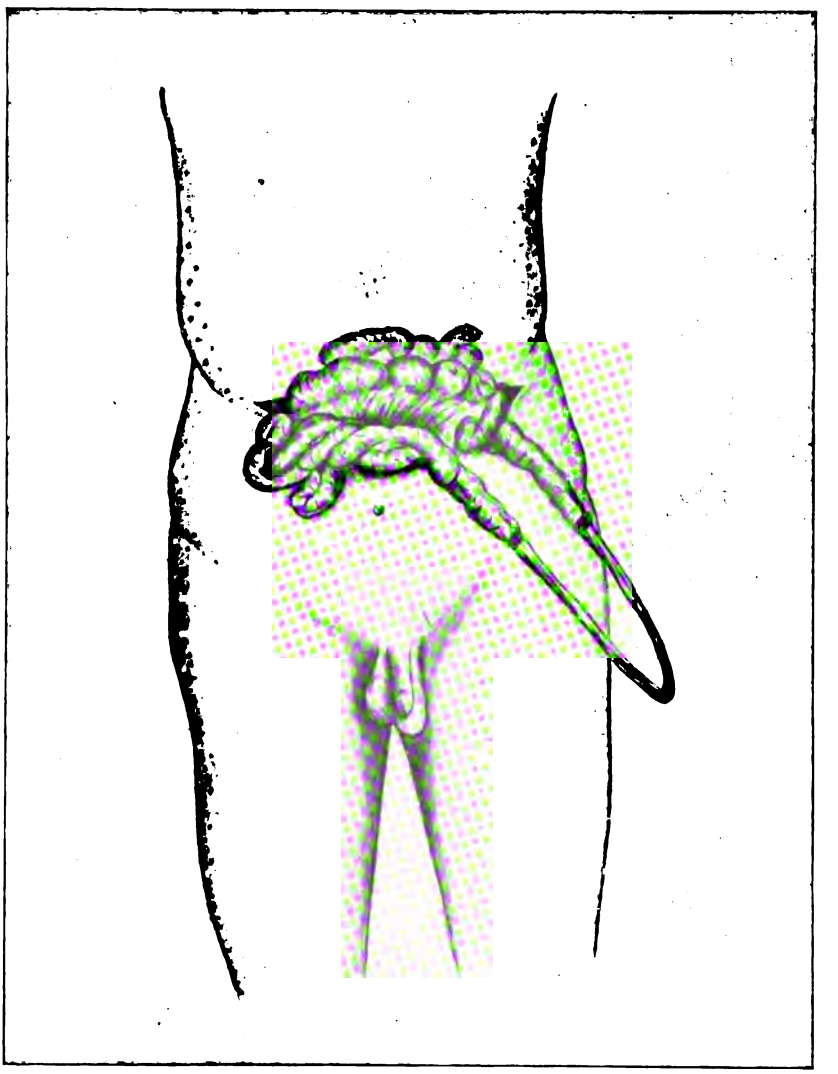


FIG. 1.—Abdominal wound, showing protrusion of intestines.

FIG. 2.—Showing wound with retained sutures.

evidences of some irritation; and on the eighth day an abscess developed in the abdominal walls, which was evacuated by breaking into the line of union with a director. After this the temperature dropped, and remained normal during the rest of his stay in the hospital.

A skiagraph was afterwards taken of the abdomen, which revealed the button in the median line below the promontory of the sacrum. The bowels were moved daily without any trouble, though, as the patient was a chronic dyspeptic, the stomach was at times irritable. All stitches were removed on the twelfth day and the button was passed on the eighteenth day. After that the patient made an uninterrupted recovery, so far as his physical condition was concerned. Mentally, he is a confirmed melancholic, and has since been removed to the State Hospital for the Insane at Norristown.

In summarizing this unusual case, I cannot help thinking that there were several factors which greatly aided in its favorable termination. Among these may be mentioned the short lapse of time between injury and surgical assistance; the temperature of the day, which was high, prevented chilling of the exposed abdominal viscera, thereby diminishing the tendency to shock; and the thorough douching with hot sterile water during the operation and hourly flushing of the abdominal cavity for two days afterwards. Then, too, by the use of Murphy's button much time was saved in making the anastomosis, thus obviating undue manipulation of the bowel, which always tends to produce for a time a certain amount of paresis of its coats which complicates the after-treatment of the case.

The question naturally arises, How shall we deal with intestinal wounds, or where disease has reduced the lumen of the bowel, so that it is no longer able to perform its normal functions? Under these circumstances we are compelled to excise the injured or diseased portions and endeavor to establish a continuous patulous tract throughout. The methods to be selected depend somewhat on the nature and extent of the injury. Where it is possible to bring the ends

of the bowel together easily, and to make a good joint upon which there is likely to be little traction, the end-to-end suture is greatly superior to any other method, because peristalsis will follow its natural course, and because there is little danger of stricture at the line of juncture. If this mode of union is decided on, the method devised by Maunsell, of first invaginating the bowel, offers one of the most rapid and thorough means of approximating the cut ends of the intestine. If speed is essential, as in the above-mentioned case, Murphy's button, which has made the operation, so far as mechanical aid is concerned, as nearly perfect as possible. may be employed. The chief objections to such devices are the insufficient size of the opening, the possibility of constricture, and the danger of the button becoming impacted.

If from any cause it is found impossible to approximate the cut ends of the bowel, they should be closed, and the coils above and below united by one of the methods of lateral anastomosis.

The length of the intestine that can be excised with recovery has been a question of both clinical and experimental interest. A number of cases have been reported where over a yard of the bowel has been removed. Trzebicky's experiments show that recovery depends not so much on the amount of the intestine removed as upon its situation. Patients in whom the first part of the jejunum had been excised showed more evidences of inanition than where other parts of the bowel were involved. He found that in animals half of the small intestine could be resected if the duodenum were left intact.

DISCUSSION.

DR. JOHN ASHHURST, JR., said that he had seen this patient when he was admitted to the hospital, and could testify to the very desperate condition he was in. No one supposed that he would recover, for patients commonly perish after abdominal wounds of very much less severity. It recalled to his mind what Dr. Harris used to say as to the Cæsarean operation, that when it was performed with a cow's horn it was often more successful

than when done with the surgeon's knife. There could not have been an abdominal section more successful than this, and a majority of the cases in which a surgeon would feel justified in even less extensive interference would be apt to terminate fatally.

COMPOUND FRACTURE OF THE HUMERUS.

DR. THOMAS G. MORTON presented a boy, thirteen years of age, who was admitted to the Pennsylvania Hospital, November 9, 1897, immediately after he had been injured by falling from a wagon and being squeezed in between the wheels and a passing trolley car. Upon examination the principal injury was found to be a fracture of the left humerus about the middle, attended by a large wound on the inner side of the left arm, on a line with the vessels, where the bone had apparently been driven through the skin. The fracture was comminuted.

The arm was placed upon an internal, angular splint, after the fracture was supposed to have been fully reduced, which required considerable manipulation, as the fragments of bone were greatly displaced. A pasteboard splint, moulded over the shoulder and arm, was also applied. There was considerable swelling of the arm and forearm, with feeble radial pulse observed soon after the arm was dressed. A radiograph, taken at this time (see Plate), showed an irregular, oblique fracture, with a detached fragment of the bone lying transversely between the upper and lower extremities of the fractured bone. The fragment measured an inch and a half in length by half an inch in width.

Several efforts were made, by manipulation, to bring this separated portion of bone in relation with the other fragments, and to retain it with splints. A radiograph, taken two weeks later, however, showed that there was no improvement in the position of the fragments and no effort at union of the bone.

Resection was accordingly determined on to remove the separated fragment, and the operation was done on the sixteenth day after the accident occurred. An incision was made on the inner side of the arm, in a line with the vessels, where the upper end of the lower fragment had become simply subcutaneous. It was found that this lower fragment had been forced through the

muscles in front of the humerus by the violence of the original injury, and was firmly held in this position. This condition had prevented the approximation of the fragments. It was found to be impossible to extricate the bone from its unnatural position until a free incision had been made on the outer aspect of the arm. The sharp, jagged, detached piece of bone between the upper and lower ends of the shaft of the humerus was then removed. Its dimensions were one and a half inches by one-half inch, as already stated. The upper and lower ends of the fractured bone were freshened, one-quarter of an inch being taken from the upper and one-half inch from the lower fragment. Close approximation of the bones was effected by sutures with silver wire. (See Plate.) Firm union soon followed, and the boy was discharged from the hospital, with a useful arm, January 13, 1898, about nine weeks after the accident.

DR. G. G. DAVIS said that a couple of years ago he had a case almost identical with this one, only of the femur instead of the humerus. The femur was broken at the junction of the middle and lower third, the upper end of the lower fragment was pushed downward and slightly outward, and the lower end of the upper fragment was displaced forward and appeared to be almost under the skin. There seemed to be a distance of almost two inches between the broken ends of the bone, but the skin was not broken. All attempts to reduce the deformity failed, so he incised and found a shell of bone about one and a half inches long, placed endways almost exactly, as is shown in the skiagraph, except that it seemed to be more firmly planted between the two ends of the bone so as to keep them apart. After the removal of this piece the reduction was readily effected and the ends were wired. In wiring bones he believed that it was best to use very thick wire; the wire used by him is at least one-sixteenth of an inch thick and extremely heavy. He was convinced that a considerable portion of the difficulties which arise in the treatment of ununited fractures comes from the fact that the wire which is used is not sufficiently firm to support the bone, while extremely thick silver wire does support it.

DR. JOHN ASHHURST said that he always used thick wire, bending the ends down or even turning them around the bone and hammering them firmly into position, thus gaining more secure fixation than can be got by simply twisting the wire. If

FIG. 1.—Comminuted fracture of the shaft of the humerus. (Morton.)

FIG. 2.—Comminuted fracture of the shaft of the humerus; loose fragment removed; main fragments secured in apposition by wire. (Morton.)

the operation is properly done there is very little risk of the wire coming away or causing irritation. In the jaw it might do so, owing to the difficulty of preventing wounds in the mouth from becoming infected, but in the long bones it gives no trouble, and may be left in with safety. In ununited fractures of large bones he employed the silver splint and screws, as used by Halsted, which are better than the wire, as giving firmer fixation, but where the bone is small the heavy silver wire is very satisfactory. It is an advantage to hammer the wire down and even to give it a half turn around the bone, somewhat like a ferrule. He had never seen any irritation caused in this way, and he had patients walking about the city now with silver wires in their legs, or silver splints, without any inconvenience.

DR. W. JOSEPH HEARN said he always used heavy wire, as it gives fixation and acts as a splint. He also always left it in and hammered it down. He had a case recently where he was compelled to wire both the radius and ulna. The radial side healed, but the ulnar side became infected. Wherever infection occurs, the bone is soft. He never had any difficulty in getting it out, simply taking a pair of forceps and firmly grasping the wire without untwisting, pulled it out. In his last case he found that sufficient callus was present to hold the bone in position. In patellas, where he had wired only twice, he had never had any trouble.

DR. DEFORREST WILLARD said he had a skiagraph which resembled very closely the one presented by Dr. Morton, except that it is of the femur. He wired this case three weeks ago, as there was no attempt at union seven weeks after the fracture. The skiagraph showed that the upper fragment was separated from the lower, while a fragment of the bone had been carried outward and had united upon the side of the shaft. He bevelled the two edges and wired them with the heaviest silver wire he could procure. Heavy wire acts very admirably in supporting and splinting the bones, while light wire allows them to move. As to the removal of the heavy wire, he nearly always turned it down and hammered it into the bone, permitting it to remain if it gave no trouble. If it does harm, it is just as easy to cut down upon it in the depths of the wound as if it were just under the skin, and by obtaining primary union one is less likely to have infection.

PERICÆCAL ABSCESS WITHOUT APPENDICITIS.

DR. W. JOSEPH HEARN reported the following case: A girl, seventeen years of age. Previous health good. No history of previous attack of indigestion. Six hours after a late supper of indigestible food she was taken with severe abdominal cramps and vomiting. The pains were over the entire abdomen. Her family physician gave anodynes to relieve her. Within twenty-four hours the pain was all gone, except some tenderness on the right side over the region of the cæcum. In the next twenty-four hours the pain and tenderness increased, with temperature 102° F. and pulse 106. Within the next twenty-four hours she was admitted to the Jefferson Hospital. The temperature was 101°, pulse 120. No abdominal distention, but the facial expression was characteristic of intense abdominal suffering. A point over McBurney's line was exquisitely sensitive. The most gentle pressure produced the most excruciating pain. The diagnosis of appendicitis was corroborated, and she was operated upon the same evening at nine o'clock. When the peritoneum was reached it was found to be opaque and thickened,—œdematous. This was carefully opened, fearing adhesions to the bowels. This was followed by an immediate escape of one and a half ounces of pus. The cavity was dried thoroughly and the peritoneum opened outside of the pus-cavity and the parts packed around with iodoform gauze. On separating the parietal peritoneum from the visceral it was found that the pus-cavity was between the cæcum and parietal peritoneum. The cæcum was highly inflamed, and at the focus of abscess almost gangrenous. The appendix was next sought for. It was apparently missing, but by tracing down the longitudinal band of the colon (there were no adhesions of the end of the cæcum) it was found, or could be felt, in the sub-cæcal fossa (of Lockwood and Rolleston), between the layers of mesocolon, as the cæcum itself, while completely covered with peritoneum, has no mesentery. The outer layer of the mesocolon was divided in a vertical direction, and the outer layer was chosen both for convenience and to better preserve the blood-supply to the colon, and the appendix secured and removed. The layer of mesocolon was then closed with catgut sutures. The abdominal cavity was protected with iodoform gauze and the ends of the gauze left out of the wound. Retaining sutures were

put in to close the wound upon the gauze not removed, which was done in seventy-two hours. Only a small piece of gauze was replaced over the abscess-cavity. The appendix, while in not a healthy condition, was not what we might term an appendicitis. The changes that had taken place in the mucosa were evidently secondary to the perityphlitis. The patient made a good recovery. The appendix was examined by Dr. Thomas Leidy Rhoads, who reports that sections were taken from the distal end and the middle of the appendix, hardened in Huydenhain's solution, infiltrated with paraffin, and stained with hæmotoxylon and eosin.

On examination the mucosa is found enormously swollen, the glands eroded, but a few remnants of the glandular structure remaining. The submucosa is likewise greatly inflamed, but the cell-infiltration does not seem to extend to the muscular coat. The peritoneal coat is not involved in the inflammatory process.

DR. JOHN ASHHURST, JR., said that he was satisfied that there are cases of typhlitis apart from appendicitis. In one case in which he operated, while the appendix was inflamed it was apparently less diseased than that in Dr. Hearn's case, and was certainly less inflamed than the cæcum generally.

DR. HEARN rejoined that he could not explain an abscess in the location named. Dr. J. Chalmers Da Costa, who assisted him, agreed with him that it was a case of pericæcal abscess. Had it been an old case with many adhesions he could never have found the appendix, and, as it was, he had only found it by following up between the folds of the mesocolon. After going to so much trouble to find it he decided that he would remove it. He believed there are secondary affections of the appendix from disease of the cæcum. There were no adhesions at the end of the cæcum. We can, no doubt, have cases of perityphlitis, but they must be very rare. The appendix was three inches from the abscess cavity and between the two layers of the mesocolon. There was no connection between the two.

OSTEOTOMOCLASIS: A PRELIMINARY NOTE ON A MODIFIED OPERATION TO CORRECT CURVED TIBIA.

By W. BARTON HOPKINS, M.D.,

SURGEON TO THE PENNSYLVANIA HOSPITAL.

As indicated by the name suggested, osteotomoclasis, the operation to be described consists of combining in a modified form both the operations of osteotomy and osteoclasis to correct a curve or bend of a long bone resulting from congenital malformation, rickets, or vicious union after fracture. Briefly stated, two operations are done, incomplete osteotomy and osteoclasis. At the first operation the bone is divided with a chisel not completely, but through more than one-half of its thickness at its inner curve. After the skin-wound has healed, but before repair of the bone has sufficiently advanced to restore the original strength at the weakened point, a period easily included between one and three weeks, the osteoclast is applied, and the deformity corrected by a fracture in the bone at its weak point. The only case upon which the operation has been performed is the following:

S. M., a healthy Italian girl, aged three years, was admitted to the Pennsylvania Hospital December 29, 1897, with bow-legs. The legs were evenly and markedly bowed, so much so that she crossed them in walking. January 10, 1898, under ether, both tibiæ were chiselled half through from within outward, but no attempt was made to break the bones. The small skin incisions were neatly closed with fine catgut sutures, and each was dressed simply with a small pad of gauze, no splint being applied. January 21, eleven days later, the child was again etherized, and the deformity of both legs was readily corrected with the osteoclast, very little force being required to effect this result. Though

FIG. 1.—Osteotomoclasis.

FIG. 2.—Representing appearance of bones two months after osteotomoclasis.

both bones yielded with an audible snap, the fracture in each proved to be incomplete, as shown in Fig. 1. This excellent skiagraph was taken while the patient was still under ether. Careful scrutiny will demonstrate (1) the chisel cut of two weeks' standing, having undergone no apparent process of repair; (2) fracture of the bone from a point corresponding to the bottom of the chisel cut, to the approximately neutral axis of the bone; and (3) the bending of the remaining portion of the shaft.

The limbs were encased in plaster of Paris.[1]

The possible advantages of combining, at times, osteotomy and osteoclasis were suggested to me by the conditions observed to have been produced by performance of simple osteoclasis for pronounced bow-legs in a sturdy child of eighteen months, as shown in Fig. 3. The remarkable similarity of the bone lesions to those subsequently found, as shown in Fig. 1, readily accounting for the suggestion. In this case the bones yielded with an audible snap, revealing a fracture which on removal of the osteoclast proved to be incomplete in both tibiæ. The inner half of the shaft will be seen to have parted while the outer half is only bent, the continuity of the bone remaining, therefore, to this extent intact. Considerable force was required, but the pads placed upon the three pressure-plates of the osteoclast prevented any bruising or damage of the soft parts. The knee pad rested on the inner aspect of the head of the tibia, the ankle pad upon the inner malleolus, while the apex pad was placed at the middle of the leg. Each of the three pads was kept in accurate position by strips of rubber adhesive plaster, which held the pressure-plates, pads, and limb firmly together.

In studying the action of the osteoclast some familiarly

[1] March 17, 1898, nearly two months later, the dressings were removed and the limbs found to be firm and straight.

Figure 2, taken at this time, affords an interesting study of the skiagraphic appearance of the bone lesions under conditions of absolute fixation. If osseous opacity to X-rays correspond to osseous density, which we have no reason to doubt, the processes of repair have more than fulfilled their work in restoring the lost continuity of the bone which existed, as indicated by the shaded points, especially in the right tibia, at the site of operation.

known principles relating to the strength of bodies and their resistance to force may be referred to. Letting a square beam of wood represent the shaft of a bone, discounting for the time the variations in form which modify its strength, the manner in which an osteoclast exerts its force would test the transverse strength of such a beam. The transverse strength of a beam is represented by two elements, its resistance to compression of one-third of its thickness and its resistance to extension of the remaining two-thirds. The line of equilibrium at which compression terminates and extension begins, being the neutral axis. "The limit of stiffness is flexure, and the limit of strength or resistance is fracture." The limit of stiffness is more easily reached than the limit of strength; if, therefore, a transverse cut is made in the beam on the side to be stretched, the latter will be weakened relatively more than by a similar cut made on the side to be compressed. The side to be stretched or extended will be fractured whether a cut is made or not, the continuity of the beam being preserved, if at all, at that portion which is only flexed, not broken. What is true of a beam of wood is, so far as present purposes are concerned, equally true of the shaft of a bone. Partial section, therefore, as described, would seem to be a rational preliminary step to osteoclasis by reducing many times the force required by the latter and by locating accurately the point of fracture. The use of the osteoclast to supplement the work of the chisel, where, as in hospitals, this rather cumbersome apparatus is available, is, for reasons presently to be mentioned, advantageous. Whether in certain cases osteotomy may be made a safer operation by combining with it osteoclasis as a subsequent step is a question which can only be decided by experience. In children so poorly nourished and unhealthy that traumatism of any kind is likely to provoke suppuration, the danger of a bone section cannot be ignored. It is in cases, therefore, whose general condition in prudent hands negatives the performance of osteotomy, that I venture to propose the modification of the latter I have suggested, as for them I believe it would prove

FIG. 3.—Showing condition of bones immediately after osteoclasis. The fibulæ are excessively bent by a retaining bandage.

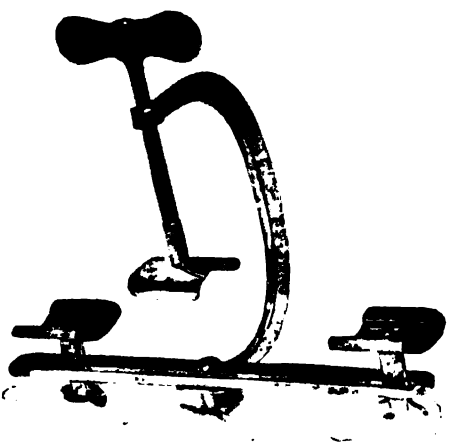


FIG. 4.—The osteoclast.

safer. Osteoclasis, although having fallen to a great extent into disuse, is especially useful for correcting trifling curves in tender bones in children whose parents cannot go to the expense and trouble of apparatus necessary for a cure by gradual means. Intelligently employed it is neither haphazard nor barbarous, and should not in my opinion be allowed to become an obsolete operation. But our subject relates to that class of cases to which simple osteoclasis is inappropriate, either because the bone is too hard or the apex of deformity is too near a joint to yield to a degree of force which can without risk be applied; suitable cases, in other words, for osteotomy. To claim, without qualification and with such scant data as we have before us, that the operation under consideration is safer than osteotomy would be premature, and would be making an unfair and prejudicial comparison with a most valuable, safe, and tried measure. This much, however, may be said; that osteotomy causes a compound fracture, the modified method a simple fracture; osteotomy produces usually a complete fracture, while by the modified method the fracture is incomplete; after osteotomy fixation is required immediately, by the other method no fixation is required, during the existence of a wound; when suppuration occurs after osteotomy, which, however, it rarely does, it is complicated with loss of continuity in the bone,—a suppurating compound fracture. Should suppuration occur after the first step in osteotomoclasis it would involve only a bone cut, not a bone section, and would be surgically far less serious than if accompanied by loss of continuity. Following the second step, after the skin-wound has entirely healed, there is of course no risk of suppuration, as the fracture produced is a subcutaneous one. Osteotomy, on the other hand, requires only one etherization, while the modified method requires two. The osteoclast shown in Fig. 4 is the one which has been used in these cases. It is very simple, easily adjusted, and powerful, but is not particularly original. The two counter-plates and the C-shaped clamp can be placed at any point desired on the pair of shears, and retained by binding screws beneath. The

apex plate is swivelled to the clamp screw. The pressure plates present concaved faces and have flanges on their lateral borders to secure the necessary pads in position. It may be said of instrumental osteoclasis that it possesses the great advantage over what may be called manual osteoclasis, in that the force used with it is under perfect control, ceasing instantly the bone yields, producing thereby usually an incomplete or green-stick fracture, while the force applied by manual effort, on the contrary, cannot be so controlled, but goes on with a rush when the resistance of the bone ceases. After osteotomy, in applying the plaster-of-Paris dressing, I always prepare to open a small trap-door by placing a wall of lead ribbon around the wound. Through this, should it become necessary to obtain access to the latter, a window can readily be cut. In healthy children this is, however, a very rare contingency, as primary union is almost invariably the rule.

The excellent skiagraphs accompanying this paper were taken by Dr. Starbuck at the Pennsylvania Hospital.

[Dr. Hopkins remarked, in closing the discussion on his paper, "The fact that in four cases which came under the observation of one Fellow of the Academy evil consequences resulted from osteotomy proves, I think, that there are certain dangers in the operation to be guarded against, which, as I have stated, should not be ignored."]

DISCUSSION.

Dr. John Ashhurst, Jr., said: This operation is certainly a very ingenious one, but there is a possible objection to it, and that is that the incision made in the bone, as described by Dr. Hopkins, makes a gap when fracture is effected in the line of extension rather than in that of flexion. In the ordinary operation, as practised by Dr. Macewen, a wedge-shaped osteotome is used and the incision is made in the line of flexion, so that a gap is left in that position. There is always a probability of the bone gradually returning more or less to its original position, and a mistake, which he had seen made by many operators, is in not

obtaining sufficient correction. They are satisfied with making the leg straight, and when the child recovers, in the course of two or three months, it will be found that the bowing has returned. The object of the cuneiform incision is that when the limb is straightened, the two cut surfaces coming together, the gap being on the outer side, or that of flexion, there will be less danger of the deformity recurring. If the incision is made as Dr. Hopkins has suggested, there certainly will be additional risk of reproduction of the deformity. This objection is more than theoretical; but, even apart from that, he did not see why this method should be preferred to simple osteotomy, which is a very satisfactory operation.

DR. DEFORREST WILLARD said it seemed to him that there were objections to this procedure. In the first place it prolongs the time of cure, and he could not see that the advantages to be gained were sufficiently compensatory; in osteotomy the operation is completed at the one time. Osteotomy is theoretically a compound fracture, but practically it is only a simple fracture from the moment of the closure of the wound. For seven or eight years he had not seen one single case fail after osteotomy, nor had he seen one drop of pus during that time. Cases heal immediately and absolutely in which the entire correction has been done at one sitting. Formerly he did cuneiform osteotomies on badly bowed legs, and a few times had suppuration, but for several years he had performed only simple osteotomies. Instead of taking out a piece he had allowed a V-shaped space to remain in the posterior portion of the bone, which has been filled in with callus, using the precaution to employ an apparatus, when possible, for a year after completion of the osteotomy cure. He had never had any serious results. In only one case had he been obliged to do a second operation; an apparatus could not be afforded, and the child was allowed to go home too early.

It would seem to him that the advantage of deferring the osteoclasis for two or three weeks after the osteotomy is not compensatory, as it is easy to straighten the bone by the hand or the osteoclast immediately after the osteotomy, and produce the same result at once which Dr. Hopkins does at a later period. Usually he did not make a complete fracture, but a green-stick break, or he allowed the fragments to interdigitate, being careful not to permit any displacement. After fixing the bone in a

gypsum splint in an over-corrected position, he always got a speedy and quick cure. The operation of aseptic osteotomy had been with him so absolutely complete and perfect as well as safe that he had learned to positively prognose a complete cure, without fever, without pain, without discomfort, and without suppuration. After aseptically locking these cases up in plaster-of-Paris he did not look at them for six or eight weeks, when the cure is complete. Having so good an operation already established, he thought the burden of proof with regard to a new operation lies with the originator to show the advantage over the old one. The vital question is, Does this prolongation of procedures delay the cure, and does it in the end accomplish any more desirable result?

DR. H. R. WHARTON said he had seen quite a number of osteotomies done by other men and had done a good many himself, but had seen very few bad results. He had seen but four cases that did badly after an osteotomy. One was in a young person where a double osteotomy was done for a knock-knee, in which a profuse suppuration occurred and a subsequent operation was necessary to remove sequestra. He eventually recovered with good motion of the knees. In a second case profuse suppuration of the wound followed by necrosis of the tibia occurred after osteotomy. In another case secondary hæmorrhage followed an operation for curved tibias requiring ligation of the anterior tibial artery some weeks after the operation. A fourth case of osteotomy for knock-knee in which non-union resulted at the end of three months, a good result was obtained by opening the wound and freshening the edges of the wound with an osteotome.

DR. G. G. DAVIS thought the osteoclast which Dr. Hopkins had shown to be one of the neatest and best that he was acquainted with, and that it was an aid in completing the division of the bone and straightening it. The trouble he had had in the manual breaking of bones, even in the course of osteotomy, caused him to desire some more efficacious means. As regards the division of the operation in two stages that he was in doubt about it. Many of these cases are to be in the hospital as short a time as possible, and the addition of ten days might be an objection.

DR. R. H. HARTE said that osteotomies were among the simplest class of cases that surgeons had to deal with, and there

are no cases so sure to be followed by satisfactory results. There is one point that he thought to be a good one, and that is the performing of two osteotomies on the same patient at the same time. If the osteotomy is on one limb at a time, he always followed the suggestion made by Professor Ashhurst as to over-correction. He used a straight splint and padded the upper and lower end and the centre, by which means over-correction was secured. He placed plaster-of-Paris on the outside and closed with a light gauze dressing. Children never have any trouble afterwards. No elevation in temperature is the rule, and the cases invariably do well.

DR. J. EWING MEARS, in connection with this subject, reported a case which came under his observation twenty years ago at St. Mary's Hospital. A child was brought in suffering from a fracture of the tibia at the junction of the upper and middle thirds, produced by an ice-wagon passing over the limb. An effort was made to get as correct an adjustment as possible. The fracture was treated with lateral splints, and the result was good. The union of the bone occurred promptly, and it was observed, after removing the splints, that the child, who had been bow-legged with curvature of the bone before the accident, had practically a straight leg on the injured side, while the other was still deformed. An interesting point is that the parent of the child instituted an action against the ice company whose wagon did the injury, and he was summoned as a witness. The lawyer for the plaintiff brought the child to his office to have him examined after a lapse of one and a half years. On stripping the child he showed him very conclusively that the injury had been of great benefit to the child, and told him that if he went into court the chances were he would be non-suited, or fail to get damages, because of the actual benefit that had been derived by reason of the accident. The suit was withdrawn and the case was dismissed. Of course, this was some years ago, before osteotomy was practised as it is at the present day.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, March 8, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

OPERATIVE TREATMENT OF DISABLING DEFORMITY FOLLOWING FRACTURE OF HUMERUS AT ELBOW.

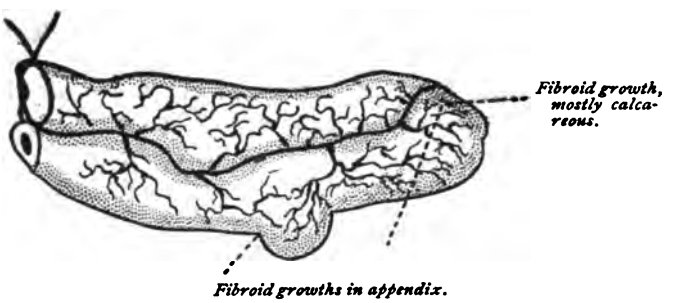
DR. JOHN B. DEAVER presented drawings and radiograms illustrating the case of a boy, thirteen years of age, who had sustained fracture of the internal condyle of the left humerus and backward dislocation of the bones of the forearm. Six months later he had nearly complete ankylosis of the injured joint. An incision over the elbow-joint anteriorly revealed the internal condyle pushed forward and surrounded by callus. The displaced and obstructing bone was chiselled away until free flexion and extension of the forearm was possible. Four weeks later the patient was discharged, having full extension, and a little more than one-half flexion.

DR. WILLIAM J. TAYLOR stated that in two instances he had operated for the relief of badly united fracture of the elbow. A very important point in dealing with such cases was to remove more bone than might at first seem necessary, for during the after-course of the case, if a large amount of bone has not been taken away, enough to make practically a flail joint, there will be a sufficient amount of new material formed to very seriously hazard the ultimate mobility of the joint.

SUPRAVAGINAL HYSTERECTOMY FOR MYOMA.

DR. DEAVER presented five specimens of uterine myomatas removed by abdominal section and supravaginal hysterectomy. The first tumor was of the size of a fœtal head. No drainage. Recovery uneventful. The history of the second case was similar

to that of the first. For the third case glass-tube drainage was employed for three days. Recovery uneventful. The fourth case was a very vascular tumor, twenty-five pounds in weight, in the removal of which there was much unavoidable loss of blood and great shock. A litre of hot, normal, salt solution was left in the peritoneal cavity, and more was injected into the subcutaneous connective tissue. Death ensued shortly after completion of operation. In the fifth case a large subperitoneal mass had developed, between the folds of the right broad ligament. It was enucleated without accident, and a good recovery followed. The vermiform appendix presented two fibroid masses (see Figure), each about five centimetres in diameter; one situated at the midpoint of the organ opposite the mesenteric attachment; the other, which had undergone partial calcareous change, was situated at



Dr. Deaver's case of fibroid growths in the wall of the appendix.

the tip, within the mesenteric attachment. The appendix walls were much thickened throughout. This appendix was removed later.

Microscopic examination revealed the appendix coats greatly thickened, the lumen almost obliterated, the mucous membrane atrophic. There was great thickening of the walls of the blood-vessels with a round-celled infiltration throughout the various layers of the organ. The side of the appendix opposite the mesenteric attachment contained an encapsulated fibrous growth, which in spots showed a tendency to calcareous degeneration.

DR. GEORGE ERETY SHOEMAKER said: In the removal of fibromas Dr. Deaver has used a method which is rapidly coming to the front, and will undoubtedly replace all others,—*i.e.*, the control of the blood-supply prior to the removal of the tumor

This is a true surgical method and is theoretically the most simple, although practically it is in some cases a great deal more difficult than it seems. Any one who is familiar with the possibilities in the way of distortion of the anatomy of the abdomen will recognize this. There are but four vessels to tie, and then one can amputate at leisure. The elements of success in hysterectomies of this type are undoubtedly the avoidance of handling the intestines and the early control of the hæmorrhage. If the arteries can be reached very early in the operation there is practically no hæmorrhage.

OPERATION FOR PERFORATING TYPHOID ULCER.

DR. DEAVER reported the following case of typhoid perforation: A woman, aged twenty-three years, was admitted to the German Hospital by the direction of her attending physician, Dr. W. Duffield Robinson, January 16, 1898, on account of general peritonitis, due to perforation of the bowel, which had occurred on the twenty-first day of typhoid fever. Up to that time the disease had run rather an uneventful course.

At 3 A.M., on the day of her admission, the patient was suddenly seized with violent abdominal pain; symptoms of collapse followed. There was a drop in temperature, reaching a point below normal, and a slight increase in the rapidity of the pulse-rate. The abdominal muscles soon became rigid; slight distention followed the rigidity some hours after the onset of pain. The pain continued to be general, "cramp-like," and quite severe, perhaps greatest about the umbilicus. No vomiting. She was admitted to the hospital at 6.30 P.M., and was etherized as soon as removed from the ambulance.

A small incision was made in the median line of the abdomen. On opening the peritoneum gas and pus escaped. Pyogenic membrane appeared on the small bowel in several places. Small bowel was quite adherent at the site of a perforation which, large enough to admit a small pea, was detected in the ileum, opposite the mesentery, about seven inches from the ileo-cæcal junction. This was closed by black silk sutures. The peritoneal coat of the bowel was united over the deep layer of sutures. The abdomen was flushed with warm sterile water and glass drainage inserted. Wound closed with interrupted silkworm-gut suture. Light aseptic gauze dressing. Abdomen packed with ice. Oper-

ation lasted seventeen minutes. Patient in her room at seven o'clock, with a temperature of 101⅕° F.; pulse, 176.

January 17: Temperature range from 100⅜° to 102⅜° F.; pulse, 172 to 128. Distention increasing; no vomiting; no bowel movement or flatus.

January 18: Temperature 104⅜° to 101⅕° F.; pulse, 152 to 142. Distention more marked. Vomited once. Sponge bath given every two hours.

January 19: Patient died at 7.40 in the morning.

Autopsy revealed "general peritonitis;" many typhoid ulcers. The sutures closing the perforation had not given way. No other perforation was found.

DR. J. EWING MEARS remarked that in cases of perforating typhoid ulcer surgical interference was not justifiable, and should not be instituted in cases in which the perforation occurs when the infective process is at its height. In mild cases of the disease, in which the pyrexia has not been of high grade and in which perforation occurs at the end of the third week or later, when the stage of convalescence is fully pronounced, laparotomy may be performed. In cases of this character Lücke's method is advised, —laparotomy with the formation of an artificial anus. Rapidity in operation will be an essential factor in the achievement of success.

GASTRO-ENTEROSTOMY.

DR. DEAVER reported the case of a man, thirty-one years of age, who, two years before, being in excellent health and without any gastric disorder, was struck violently across the abdomen and left arm with a wire one-half inch in diameter. About a dozen blows landed on his abdomen, as patient could not get out of the way, his back being against the wall, and the machine in front of him. With his right hand he brought the machine to a stop. He was immediately taken to his home, where it was found he had received a fracture of the lower left forearm. Patient confined to bed. On the third day he had bloody vomiting; the amount filling a washbasin and a chamber vessel. Fever continued for a day with delirium. In about a week or ten days was out of bed. From the time the vomiting set in he complained of severe pain on eating, followed by vomiting. For about a month vomiting continued three times per day, usually after eating, with very severe pain. During this time his

appetite was excellent, but he did not dare take much food on account of the severe gastralgia which followed. The pain in the epigastrium and vomiting every three or four days continued during the year of 1896 and spring of 1897. Lived on a light diet of eggs and milk. In October, 1896, had to stop work on account of weakness. On July 4 he had two attacks of bloody vomiting. The first spell contained bright red blood, the second, which followed after some hours, contained clotted blood. Vomiting and pain still continued. He lost about sixty pounds in weight.

Under ether, an incision was made in the linea alba from the ensiform cartilage to a point midway between the same and the umbilicus. A mass the size of a medium-sized orange was found at the pylorus. The extensive adhesions, the infiltration of adjoining stomach and duodenal walls, and the very bad general condition of the patient influenced him against so radical an operative procedure as excision. Stomach opened and digital examination made, which disclosed a practically occluded pylorus. A lateral anastomosis was established between stomach and small intestine by incision and suture. Abdomen closed without drainage. Uneventful recovery. The immediate result of the operation was that the patient was able to take more food, but not much solid food. There was no more vomiting, but some pain still continued.

Dr. Deaver remarked that the chief points of interest in this case were first the traumatic origin of the growth; second, the open question whether the growth be malignant or not; third, that the anastomosis was made by simple suture. It is the rarest thing for him to use any mechanical device in this operation, believing that greater good is accomplished by being able to make the orifice of communication between the parts anastomosed much larger than can be done by using most of the mechanical appliances originated for this purpose.

ABDOMINAL SECTION FOR GUNSHOT WOUND OF THE STOMACH.

DR. THOMAS S. K. MORTON reported the case of a man, aged thirty-two years, who was admitted to the Samaritan Hospital July 31, 1897, and discharged August 29. He was sitting in a water-closet at a suburban park when a rifle was accidentally dis-

charged in a shooting gallery near by. The ball, a conical .22 calibre, penetrated the one-inch-thick board forming the wall of the privy and entered the patient's right loin, two inches outside of the vertebral column and about midway between the crest of the ilium and last rib.

Upon admission to the hospital, a few moments later, he was found to be in a condition of severe shock, and was reported to have vomited largely of blood. External heat and stimulants were applied. Dr. Morton saw him two hours after the accident. At that time he was in slightly better general condition, and complained of excruciating abdominal pains as well as of continued nausea. Manipulation of the abdomen originated severe cramps. The ball could be felt subcutaneously about half an inch to the left of the median line midway between the ensiform cartilage and the umbilicus. The urine was drawn and found to be free of blood, so far as ocular signs were concerned. The genito-crural nerve had evidently been cut by the projectile, as complete anæsthesia prevailed in the distribution of that nerve on the right side. He again vomited a quantity of blood during the examination. It was determined to at once proceed with operation without awaiting reaction, as bleeding evidently was continuing.

Ether was administered, and a three-inch incision made in the median line between the umbilicus and ensiform cartilage. Considerable free blood was found in the peritoneal cavity beneath the line of incision, and an opening in the anterior portion of the stomach was immediately discovered, owing to a circular ecchymosis about an inch in diameter surrounding it. Upon lifting the viscus a quantity of air, mucus, and clotted blood was ejected through the wound of its wall, because of a sudden contraction of the muscles of the organ, as is so often observed in handling it during operative manipulations. The wound was sutured by two stories of interrupted Lembert stitches of silk. The folds of peritoneum about the pylorus and the two omenta were distended with clots of blood, which made search for the posterior or entering wound difficult. It was determined, however, that the posterior wound was not in a free portion of the viscus, hence, while it might give rise to post-peritoneal abscess, which could be dealt with should it arise, it would not be likely, should leakage take place, to originate peritonitis. The question

then arose as to the desirability of freely incising the stomach for the purpose of discovering the wound of entrance and also to more effectually stop hæmorrhage from the gastric arteries supposedly divided by the ball in its course through the organ. But on account of the desperate condition of the man it was decided simply to carry a wick of iodoform gauze down to the pyloric region and bring it out through the partially sutured abdominal wound. This was done so that if leakage took place thereabouts it would be led up through the parietal wound.

The man made a good though slow recovery. The wicking was removed on the third day, and the portion of the wound through which it emerged healed by secondary union. The urine passed for some days after the operation contained blood in varying amounts, which led to the belief that the right kidney had also been traversed by the ball. No other symptoms of kidney injury or disease presented themselves, however, in the subsequent course of the case. He was discharged well in four weeks with a firm cicatrix but very anæmic.

At the time of the meeting the patient, who was exhibited, had regained his usual strength and color. He did not then suffer from dyspepsia or other sign of gastric ulcer, and stated that he felt about as well as ever and was able to follow his occupation,—that of leather-dresser. The cicatrix was very firm. Anæsthesia of the distribution of the genito-crural nerve remained.

CHRONIC OSTEITIS OF TIBIA, OF TRAUMATIC ORIGIN.

Dr. J. Ewing Mears exhibited a skiagraph of an injury of the lower end of the tibia of the right leg. The patient, a young man, aged nineteen years, in climbing a picket-fence, five years ago, caught his foot between the pickets and fell. Immediately after the fall he was able to walk home, a slight abrasion alone indicated the point of contact of the ankle with the pickets—about two weeks after the receipt of the injury swelling supervened, the patient began to feel pain, and to walk lame. These conditions have continued until the present time, notwithstanding the efforts which have been made to relieve them. Local applications of all kinds—the use of fixed apparatus, the application of splints, change of climate, internal medication—have failed in

turn. An interesting feature of the case has been developed in the fact that the patient, who was sent to Denver, Colorado, for relief, could not remain in that climate on account of the severe pain he suffered. As is well known, this climate is a notably dry one, and yet it is not regarded favorable, so the patient states, for the relief of rheumatic conditions. Measurement about the ankles shows the right to be one inch greater in circumference than the left one.

The skiagraphic picture is not as distinct as desired. It shows, in a sufficiently distinct manner, however, the increase in size of the lower end of the right tibia. The evidence of fracture is not present. There appears to be a difference, whether real or apparent, between the articulating relations of the astragalus, os calcis, and scaphoid bones of the right and left foot.

Abscess of the bone has been suggested. The symptoms seem to indicate the existence of periostitis, with resultant osteitis, slight in character.

The patient now uses crutches, keeping all weight from the foot. Pain still continues. Dr. Mears proposed for relief of the condition counter-irritation, preferably by the cautery.

Dr. H. R. Wharton said that he had under his care a woman who presented somewhat the same history, and there appeared to be some thickening about the lower end of the tibia. She suffered with severe pain of an intermittent character, especially at night. He suspected some specific trouble, and put her on full doses of iodide, with which she had been very thoroughly treated already. He then thought of a periostitis, which might be relieved by a simple incision of the periosteum, so he cut down and incised. In doing this he discovered a large thickened and obliterated vein, probably the internal saphenous. He excised this and several branches of the internal saphenous nerve adherent to it, and a perfect recovery resulted, the wound healing promptly. Some months afterwards he saw the patient, who said she was entirely relieved.

THE IMPORTANCE OF CHRONIC IRRITABILITY OF THE COLON WITH MUCOUS STOOLS AS A SYMPTOM OF APPENDICITIS.

By GEORGE ERETY SHOEMAKER, M.D.,

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As time goes on the number of cases increases in which appendicitis can be studied in its relation to the life-history of the patient, and relations of the disease can be determined which were at first obscure. It is not designed in this place to consider at all the well-established symptoms which accompany the acute inflammations of the appendix, but to draw attention to a point apparently much neglected in the history of some chronic forms of the disease,—viz., the prevalence, possibly for years in the life-history of the individual, of attacks of catarrhal enteritis with copious discharges of mucus. Also to the symptom of mucous discharges, in relation to attacks of recurrent appendicitis.

Patients complain of attacks of diarrhœa with general abdominal soreness without adequate cause. They may be extremely susceptible to temperature changes, so that the abdomen must be protected by woollen clothing at all seasons of the year to prevent the onset of attacks of diarrhœa with pain and soreness. The whole abdomen may be more or less constantly sore to the touch in some cases, and the jar of walking is felt. The slightest indiscretion in diet brings on copious bowel movements, often quite offensive, accompanied by pain, and the free discharge of mucus. The patient often mistakes this mucus for pus, and even intelligent persons will erroneously give a history of an abscess, filling

and emptying through the bowel repeatedly. The condition may date back to a pelvic inflammatory attack, which, according to the statement of the patient, has been diagnosed typhoid fever, but which was probably appendicitis. This condition of irritability of the colon—for it is a form of colitis—may continue for years before an attack occurs which is sufficiently definite to lead to the suspicion of appendicitis.

The relation of appendicitis to these mucous discharges and irritability of the colon may be approached from two points of view.

(*a*) As assisting in the differential diagnosis of appendicitis in obscure or complicated *acute* cases of localized pelvic inflammation.

While the typical case of inflammation of the appendix in perfectly healthy young adults can be diagnosed with great certainty along certain well-understood lines, yet no one conversant with the variety of conditions to be met in the abdomen can fail to admit that the question of differential diagnosis in atypical attacks, where long-standing abdominal disease of gall-bladder, ovary, tube, etc., has been present, is often one requiring the nicest discrimination, particularly in women with a history of recent post-puerperal trouble. For example, the writer to-day operated upon a case of ruptured ovarian abscess and ovarian cyst with inflamed appendix adherent to the cyst. One need not look far into the literature of the subject to find that even good surgeons have been mistaken in the separation of appendicitis from such conditions as tubal or ovarian inflammation or abscess, perirenal abscess, extrauterine pregnancy, obstruction from bands, inflammation of misplaced gall-bladder, tubercular disease of the right pelvis, perforated typhoid ulcer, and the like.

The point which it is desired to urge in this connection is simply this: that, whether a history of previous attacks of appendicitis can or cannot be made out, if there is a history of chronic irritability of the colon, with frequent *mucous*

discharges, the probability of the involvement of the appendix is enormously increased.

The following case may illustrate the applicability of this test in the recognition of appendicitis in connection with disease of the female pelvic organs:

Mrs. H., aged thirty-eight years, three children, youngest two years old, applied to the writer's service at the Methodist Hospital, suffering from subacute (seven weeks old) inflammation of the right side of the abdomen, together with a history of uterine prolapse and disease. The uterus, however, having been kept inside the body during the recent inflammatory attack, no longer descended, but was held up by a high attachment of the right tube and ovary to a very tender thickening indistinctly outlined in the lower appendical region. The tube was lost in this thickening, and its outer end could not be demonstrated bimanually. Now, according to her history, she had been a great sufferer from pelvic distress ever since the birth of a child three years before, when she had had fever. This looked towards a diagnosis of tubal disease. But the right-sided symptoms especially dated from a so-called attack of typhoid fever eighteen months before, since which she had had four inflammatory attacks in the right side, and was just recovering from the last. This suggested appendicitis also. The writer long ago learned to place a history of typhoid fever in a case presenting itself with a pelvic inflammatory lesion in the same doubtful category with the history of malarial fever occurring in childbed.

The thickening could readily be felt by the vagina, but, while rather low for an appendicitis, it was rather high for a salpingitis, and the question as to whether a median or lateral incision should be chosen had to be decided. When, however, attention was directed to the presence or absence of mucous discharges, their presence was considered strongly confirmatory of the involvement of the appendix, whether anything else were involved or not, and lateral incision was made. The pertinent history was this: During each of the four attacks severe pain would begin over the lower border of the liver; it would gradually extend to the region of the appendix, and this would be followed for a week or more by discharges, several times a day, of mucous stools, a teacupful at a time, with much pain. The Fallopian tube was

found, at the operation, to be several times its normal thickness, but when freed from adhesions near the ilio-pectineal line behind, was seen to contain no fluid, and it was not removed. The appendix was very short and nearly half an inch in diameter. Its walls were thickened by inflammation. It was buried in comparatively firm adhesions beneath the caput coli, and though some yellowish lymph was in its bed, there was no perforation and no pus. There was subacute adhesive peritonitis of the surrounding viscera. The appendical wall was so softened as to perforate during the stripping of the peritoneum prior to ligation. The appendix was removed, the whole abdomen flushed but not drained, and the woman, having recovered, is now awaiting the contemplated operation for prolapse of the uterus.

(*b*) The possible *rôle* of the appendix in chronic catarrhal intestinal conditions.

This is a subject which calls for more careful study than it has yet received at the hands of the profession.

The writer is convinced that in many individuals suffering from symptoms of chronic colitis or chronic enterocolitis, without distinct crises referable to the right side, the appendix may be and sometimes is at fault. If called upon for an explanation of such a relation, it may be said that an appendix only moderately diseased, as regards its muscular walls, no doubt often presents a sacculated culture field. Its walls are not simply those of the intestine, but contain many glands, and an especial development of lymphoid structure analogous to lymphoid gland structure elsewhere. It is not unlikely that in such a sac or culture-chamber there may be presented a suitable field for the development of such modified conditions of the colon bacillus, or other normal bacteria of the intestine, as render them, when poured out into the intestine, a new factor in its chemistry, favoring the production of the extremely offensive, peculiar, mucous stool seen in these cases.

Two cases may be narrated as further illustrating the subject under consideration.

(1) Male, aged forty-four years. A vigorous and athletic

man of strong character and entirely free from neurotic symptoms. For ten years subject to frequent attacks of catarrhal enteritis due to the slightest causes, especially exposure of the abdomen to cold. Obliged to wear a flannel apron. Gradually increasing sensitiveness of bowels, until allowing a sack-coat to be unbuttoned for a few hours would bring on diarrhœa. In the summer of 1894 a slight attack of appendicitis occurred, recovery following without operation. Two attacks somewhat more severe followed in the next two years. An adherent appendix was removed by another surgeon during an interval in April, 1896. Since that time there has been complete disappearance of bowel trouble. He never resumed the heavy flannel bandage previously worn, and now habitually wears no overcoat in winter, as he says "never knowing that he has any bowels." The relation appears to be established in this case by the two years' subsequent experience of immunity.

(2) A marked case of chronic mucous diarrhœa or colitis. X., aged thirty-four years, married, was sent for operation from a Western city, with a diagnosis of old pelvic abscess, which had discharged repeatedly into the bowel. According to letters brought from attendant and consultant physicians she had had eight months before a tumor in the region of the *left* ovary, which had disappeared after a "very copious discharge of pus from the rectum." This discharge followed several weeks after the miscarriage of a dead fœtus. She had been quite ill at the time, with a temperature ranging to 102° F. and a pulse of 130. Every two or three weeks since there were said to be painful accumulations of pus and discharges by the rectum. Her physicians considered her a case of old pelvic abscess with rectal sinus, following abortion. On admission she was found to have a badly torn perineum and a completely retroverted uterus, with a large prolapsed ovary. No pus was found in the stools, which were offensive, frequent, and contained large quantities of gelatinous mucus. She was quite neurotic and was practically invalided. From the remarkably circumstantial account of the former pus discharges, obtained both from the patient and physicians, it was supposed that the remains of an old pus-sac might be found somewhere in the abdomen, but on section this was found not to be the case. The Fallopian tubes were absolutely sound. The left prolapsed ovary contained a cyst, with bloody contents, not more than two

inches in diameter, and not adherent. The uterus was large and doubled sharply back, but no thickening of the broad ligament existed; in fact, nothing could be found which would indicate that an extensive connective tissue inflammation had ever existed. The cystic left ovary was removed, and the uterus suspended. The appendix was very long and large, its walls abnormally thick, but *not adherent*. It was removed in accordance with the writer's custom when operating under such conditions. The perineum was afterwards repaired. During convalescence treatment was directed to the mucous entero-colitis. Colon washing and peptonized milk diet were the chief measures used. Recovery was perfect, though little immediate general improvement followed. She discontinued the milk diet at once and colon lavage later, but her health gradually returned. The mucous diarrhœa ceased in three months; her nervous symptoms entirely disappeared. She gained greatly in weight, and writes nine months later gratefully, "I am in perfect health."

Comment.—She had undoubtedly had puerperal sepsis long before, but it had left no physical traces. At the time of the operation her symptoms were due to lacerations, uterine and ovarian descent, and to chronic mucous colitis. I am, however, unable to explain her cure, except on the hypothesis that the removal of the appendix removed an exciting cause of the colitis.

An examination of some of the principal monographs upon appendicitis fails to show that any considerable attention has been given to the symptom under discussion. Nearly all writers fail to mention it at all. The most complete consideration found was in the excellent treatise of Talamon ("Appendicite et Perityphlite," Ch. Talamon, *Médecin de l'Hôpital Tenon*, 1892, Paris, p. 155). He speaks of chronic irritation of the large intestine, followed by mucous colitis (la colite muqueuse), as associated with recurrent appendicitis. Alternating constipation and painful mucous stools are among the symptoms mentioned as occurring between the crises. He also says that it is not always easy to decide whether these intestinal symptoms precede or follow the first attack of appendicitis. Not only does he consider, however, that mucous colitis in a number of cases ought to

be considered as a predisposing cause of appendicitis, but that it is also certain that the symptoms of this colitis are observed in recurrent appendicitis during the intervals between crises.

There is a remarkable disease of the large bowel known as mucous colitis or membranous colitis, which is essentially chronic, lasting for years, and which is characterized by stringy, tenacious sheets of mucus, or even tubular casts of the colon, and frequently associated with great pain. According to Osler ("Practice of Medicine") the origin is unknown. He states (page 440) that mucous colitis with enteralgia in nervous women is sometimes mistaken for appendicitis, and that in two instances of the kind he has prevented proposed operation. In his description of appendicitis, however, the writer has failed to find reference to the painful crises followed by discharges of several ounces of mucus, which are undoubtedly observed in some cases of marked chronic appendicitis. Whether he really did the patients a kindness in preventing the operations referred to might be a matter for further consideration and investigation. The differential diagnosis in true mucous colitis would appear to rest upon the existence of mucous casts in the stools. It is not claimed that the pathology of this disease can be settled off-hand by calling the cases appendicitis, but it is claimed that in every such case careful investigation should be made with this relation in view, and if there is good reason to suspect the appendix, it should be removed.

Abundant mucous stools may occur in tuberculous intestinal disease, and in some forms of colon ulceration.

The object of this paper is to draw greater attention to the relation of the two conditions, especially in doubtful cases, and where other diseases coexist. In all cases of chronic intestinal catarrh, especially in chronic nervous invalidism with obscure disease of the pelvic organs, the writer has learned by experience, in a number of cases, strongly to suspect the vermiform appendix. No case should be considered hopeless until this clue has been thoroughly worked

out. A thickened appendix can often be palpated. The very wide distribution of pain must not be allowed to weigh too heavily against the probability of appendical disease. This diffusion of pain is due to the fact that the same plexus of the sympathetic, the superior mesenteric, which supplies the appendix, is also widely distributed to the small intestine. The varying position of the appendix must also be considered. Careful attention to the points under discussion may save a serious error in diagnosis and may lead to the cure of a very troublesome condition of chronic invalidism.

DISCUSSION.

DR. JOHN B. DEAVER said that he had met with more cases of colitis in neurasthenic women with movable kidney than with appendicitis. He had operated for movable kidney under these circumstances several times. He had followed up some of these cases since, and a large percentage of them had been relieved. A movable kidney in contact with the colon is capable of exciting an irritation which will result in this condition of affairs. He also believed that the appendix was responsible for a certain percentage of cases, but did not think one could settle this matter definitely until the appendices had been examined microscopically. He had gone so far as to say that all cases of intestinal dyspepsia would get well sooner by having the appendix removed, combined with dietetics, rather than medication. There is no doubt that the *rôle* the appendix plays is a most important one. So far as differential diagnosis goes, Dr. Shoemaker had brought this out strongly. In cases of right-sided inflammation of the Fallopian tubes, ovarian cysts with a comparatively short pedicle twisted upon itself with gangrene of the walls, small ovarian cyst of right side having undergone suppuration, etc., is in many instances impossible to differentiate, and nothing short of an operation will disclose the actual condition of affairs. The case that Dr. Shoemaker reported proved this very well, and showed the intimate relation that the appendix held to a small ovarian cyst. Bimanual or vaginal examination would not show this. A certain percentage of tubal cases are the result of appendicitis, since the appendix is associated with the right broad

ligament by another ligament, and, in addition, there is an intimate connection between the lymphatics of the two, so that infection may take place through the one to the other.

As to enterocolitis, he had operated, during the last year, on 230 cases of appendicitis, and the percentage of those with enterocolitis was very small, but there is no doubt that it does occur as the result of chronic appendicitis.

ACUTE INFLAMMATION OF THE GALL-BLADDER.

By MAURICE H. RICHARDSON, M.D.,
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My attention was first called to the subject of acute infections of the gall-bladder, not, as might naturally be supposed, in well-known or suspected lesions of the gall-bladder, but rather in those cases in which acute abdominal symptoms suggested most strongly an acute intestinal obstruction or an appendicitis. Acute inflammations of the gall-bladder are by no means uncommon, especially in the course of acute infectious diseases, and as the result of prolonged cholelithiasis. I do not intend, however, to discuss those inflammations of the gall-bladder, whether chronic or acute, which are known to be dependent upon gallstones, upon typhoid fever, upon pneumonia, or upon infectious processes elsewhere, but rather those of sudden onset in patients of apparently perfect health. Though in most of the cases herewith reported no lesions of the gall-bladder, of the bile ducts, or of the liver had ever been suspected, yet careful questioning brought out in several a history more or less suggestive of gallstones in the gall-bladder. In a total of fifty-nine operations upon the gall-bladder, not more than ten cases can be regarded as cases of acute infection without known pre-existing disease.

The subject seems worthy of discussion in connection with that of acute abdominal lesions demanding immediate interference; for acute cholecystitis—acute accidental cholecystitis, if I may thus designate this lesion—though comparatively rare, is more frequent, at least in my experience and in that of the Massachusetts General Hospital, than such well-recognized lesions as intussusception, volvulus, or other forms of acute intestinal obstructions.

The importance of early recognition is quite as great in cholecystitis as in appendicitis, though, perhaps, it is not so pressing as in those acute intestinal obstructions dependent upon lesions which produce an early intestinal gangrene. Furthermore, the disease under consideration has received but scanty consideration, especially as regards diagnosis. Indeed, the differentiation of this lesion from inflammations of contiguous organs, or even from lesions remote from the gall-bladder, is, with our present knowledge, at times practically impossible. I have therefore ventured to present the clinical, operative, and pathological aspects of

a few cases, hoping to suggest points the discussion of which may prove of value in the future.

Acute infections of the gall-bladder are very serious; surgical intervention is almost always demanded. Left to themselves, the cases are liable to result in rupture, or even in gangrene, with escape of septic fluid either into the adherent contiguous viscera or into the general peritoneal cavity. In some instances the process is so violent and the invasion of the gall-bladder walls so extensive that gangrene is produced, the patient's life threatened, and often lost. Very recently an instance of this kind arose in which the lesion was not even suspected before operation, and yet in which the gall-bladder was found to be gangrenous and the focus of a spreading general infection.

CASE I.—Mrs. C. D., a woman of great strength and endurance, aged sixty-two years, a patient of Dr. Chase, of Sharon, was taken Saturday, October 9, 1897, with severe abdominal pain. There had been for seven years occasional attacks of pain, which were supposed to be dependent upon gallstones. The attack of October 9 was the first after an interval of fourteen months. This lasted only a few hours. On Tuesday, October 12th, she was seized with lancinating pains near the anterior superior spinous process of the right ilium. With the attack of Tuesday she began immediately to regurgitate a dark fluid; the abdomen became rapidly distended, everywhere tympanitic and tender, the tenderness being most acute in the region of the appendix. There was no tumor, no localized resistance, no dulness. The ascending colon seemed greatly distended. The pain, which came on in paroxysms, with intervals of apparent ease, was accompanied by loud borborygmi, which suggested mechanical obstruction. The evening temperature of the day before was 99.4° F., the pulse 96; the morning temperature 99°; the noon, 101° F. There was a small femoral hernia. No jaundice had ever been observed. There had been slight loss of weight.

In this case it seemed clear that there was some kind of a mechanical obstruction, probably a malignant stricture of the sigmoid flexure, of long standing, plugged by a solid particle of food, a condition of things which I had often seen. Appendicitis was considered as a possible cause. Whatever the lesion, there seemed to be a serious peritoneal infection, and the prognosis was grave. Under ether nothing new could be discovered; there was no guide to the lesion; no choice for the line of incision. A median cut was therefore made, sufficiently long to explore the whole alimentary tract. The large intestine was normal, the sigmoid flexure and the ileo-cæcal valve healthy, the appendix unaffected. The gall-bladder, however, was acutely inflamed, distended, black, gangrenous, adherent to the contiguous viscera, and surrounded by a thin, offensive exudate. The right upper quadrant of the abdomen was the seat of a spreading peritonitis. After closure of the abdominal wound the gall-bladder was exposed by an oblique incision. The fundus was aspirated; then, after having been carefully walled about with gauze, freely opened. The gall-bladder contained hundreds of minute gallstones, suspended in a dark, offensive fluid. The gall-

bladder was drained, and the wound partly closed. The patient died in eight hours from the original peritonitis and the operative shock. The operation was too late. This was not my first experience in acute cholecystitis, but one of my latest.

Was a diagnosis in this case possible? Could the lesion have been correctly localized, or at least limited to one quadrant of the abdomen, so that the shock of preliminary exploration might have been avoided?

Although it is doubtless true that most cases of acute infection of the gall-bladder—other than those from such sources as typhoid fever, gastro-duodenal catarrh, etc.—are directly or indirectly the result of gallstones, nevertheless, some forms of gall-bladder infection are met with in which the connection between the lesion and the gallstones cannot be established. In four at least of the cases herewith reported no signs of gallstones were perceptible. If the infection was a result or a complication of gallstones in these cases, the stone must have escaped into the duodenum at the very outset of the inflammation, an hypothesis which, in the absence of jaundice, does not seem tenable. It is probably true that in most instances the integrity of the gall-bladder has been impaired by gallstones in such a manner as to invite infection —an impairment especially conspicuous when this viscus has been making violent and prolonged expulsive efforts. In these cases the gall-bladder is often found thickened and contracted; in many the cystic duct is closed. Such pathological changes are doubtless the result of long-continued inflammation and persistent contraction—conditions which have resulted in excessive hypertrophy of the walls, and serious changes in the mucous membrane, changes which in many cases may result in malignant disease. Even in cases of gallstones without contraction or hypertrophy of the gall-bladder, adhesions to contiguous viscera, as demonstrated during cholecystotomies, show that at one time or another inflammation or at least irritation of the gall-bladder has existed. It is through such changes in the structure of the gall-bladder wall that infections generally take place, whatever may have been the means of infection. In those cases of cholelithiasis in which there have been no changes in the gall-bladder or its ducts, and in which there have been no symptoms, the manner of infection admits only of conjecture; indeed, it is hard to see what bearing a few smooth bodies, such as gallstones usually are—bodies with rounded edges, neither large nor impacted—can have in producing a septic infection; for the ordinary experience in the surgical treatment of gallstones shows that in many instances the mucous, as well as the serous, surface of the gall-bladder is unaffected. Moreover, even if gallstones are found in the acutely inflamed gall-bladder, they have in most instances never given the

slightest evidence of their presence. We are forced to the conclusion, therefore, that in some instances, at least, gallstones have no influence in the production of the infection, though their presence may indicate an abnormal condition of the bile or the existence of the germ contaminations by which they were originally produced. Gall-bladders in which calculi exist without symptoms may be the seat of some obscure process which facilitates bacterial infection. Be that as it may, the fact remains that acute infections do take place without the influence of gallstones.

The case seems to be different when a gallstone has become impacted in the cystic duct, or has become, through ulceration, imbedded in the gall-bladder wall; for the altered surface distinctly invites infection. An impacted gallstone makes the gall-bladder vulnerable to invasion, just as a fæcal concretion makes the vermiform appendix. The analogy between the vermiform appendix and the gall-bladder, however, is not complete for several reasons: the gall-bladder does not resemble closely the appendix in its anatomical structure; in the appendix there is always, at the very seat of the ulceration or the irritation, abundant septic material; in the gall-bladder the bacterial invasion from the alimentary canal must take place through the common duct and the cystic duct, or through the intestine adherent to the gall-bladder. The last channel is an improbable one, however, because adhesions presumably do not take place until after the invasion; indeed, in all cases of acute inflammation of the gall-bladder which I have seen the adhesions have been recent; they have been the result of the infection rather than the means. Invasion through the medium of the blood would seem to be the only explanation of those infections which take place in the normal gall-bladder, in the absence of calculi and of infection of the bile ducts. Furthermore, with reference to the invasion of the gall-bladder through the common duct, in practically all instances of acute cholecystitis that I have seen there has been no indication whatever of disease of the bile ducts, cystic, biliary, or common; there has been no gastro-duodenal catarrh, no plugging of the common duct, no general liver infection. Had any such complications been present in Case I., herewith reported, the source and channel of infection would have been obvious.

In the disease under consideration, the great distention of the gall-bladder always present suggests a possible cause of infection, the over-distention interfering more or less with the circulation of the gall-bladder wall, and thereby inviting bacterial lodgement. Carried to an extreme degree, the distention may result in complete stasis, causing total gangrene.

Distention of the gall-bladder is certainly an important factor in acute cholecystitis. At the outset the distention may be due to an irritation at the mouth of the cystic duct, with closure often caused by the pressure or the irritation of a gallstone, without impaction. An overdistention results, which closes still more tightly the cystic duct. Finally, by bulging of its walls a valve-like action is produced upon the duct, by which the greater the pressure the tighter the valve. The causation of distention is not unlike that in an intermittent hydronephrosis. It is doubtless as true in the gall-bladder as in the kidney, that overdistentions tend to relieve themselves; yet at times the distention is, from the beginning, sudden and complete. These are the cases which without premonitory signs result in acute inflammation. I have seen, for example, two cases in which pain of an intermittent character in the right hypochondrium has suggested gallstone colic. These symptoms, persistent, distressing, disabling, seemed to justify interference. Cholecystotomy relieved completely the symptoms, but did not explain the intermittent and painful distention which caused them; for in neither instance was anything abnormal found—there were no gallstones, the gall-bladder walls were unaffected. Obstruction to the flow of bile, whether by impaction of stones in the biliary passages or by closure of the cystic duct, favors rather than hinders an ascending infection. Experiments show that ligature of the large bile ducts does not prevent infection, but renders it more liable to occur (Horman: *Cent. für Bakt.*, 1895, p. 48). The inference is that obstructing calculi act in the same way.

The shape and size of an acutely inflamed and distended gall-bladder do not differ materially from those of a chronically distended one, except that the former assumes its altered shape suddenly, and is not influenced by those adhesions which almost always exist in lesions of long standing. In acute distention the gall-bladder usually attains its greatest elongation toward the long axis of the body, in the direction of the foramen of Winslow. In such cases its depth is often remarkable. The attachments to the liver hold the fundus against the abdominal wall; its circular fibres prevent dilatation from side to side. Elongation must, therefore, take place upward and inward, in the direction of the long axis. The escape of bile through the cystic duct is doubtless impeded in this form of distention more than in any other, the dilated base forming a pouch above the mouth of the duct, which is thereby compressed and more or less completely closed. Whether such valve-action is produced or not, the subsequent history of these cases would seem to indicate that excessive distention does in some way add to the difficulties of drainage through the cystic duct, for in most, if not in

all cases, drainage through the abdominal wound is followed in the course of a few days by the flow of normal bile, even though at first nothing but mucus, pus, or decolorized bile escapes.

It seems not unreasonable, therefore, to conclude that in many cases, and in fact in all in which no stone is found impacted, the cystic duct is first closed or at least obstructed by swelling of its mucous membrane, and that this obstruction is augmented by dilatation of the gall-bladder and pressure upon the cystic duct.

The shape of the dilated gall-bladder is usually conical, whatever the direction in which its fundus may point. Not infrequently its conical fundus points directly downward. In this form of dilatation its size may be excessive, and it lies, in most cases, over the descending colon. In one instance it was buried among the intestines, though not retro-peritoneal.

The degree of distensibility depends upon the strength and thickness of the walls of the gall-bladder and upon the adhesions. In the cases especially under consideration in which no previous symptoms have been prominent, the gall-bladder has usually been thin-walled and its dilatation excessive. In some instances the attachments between the liver and the gall-bladder are very strong and thick, the gall-bladder appearing as a rounded, sessile tumor upon the under surface of the liver. In such instances the dilatation has been downward, and the shape globular.

As a rule, the septic gall-bladder is symmetrical, not irregular. It has a distinctly abnormal feel. The sensation which such a gall-bladder gives to the finger is that of a resistant, adherent, but easily separated viscus. It feels like the acutely inflamed and thickened vermiform appendix surrounded by omentum and buried in easily-yielding adhesions. This pathological condition, which in most cases is recognized first by the finger, is characteristic and very important. Many instances might be given in which the situation of a serious abdominal lesion is detected by this peculiar condition of acute inflammation with recent, easily separated, granular-feeling adhesions.

The gall-bladder itself varies in its appearance to an extreme degree. When distended by healthy bile, by thin mucus, or by decolorized bile, the gall-bladder is translucent, and its peritoneum unchanged. When a septic lesion is present, the surface of the gall-bladder is opaque, granular, and roughened. The color varies: it may be pink, red, dark red, green, light green, dark green, hemorrhagic, and even black. The variation of the gall-bladder in color and consistency is not unlike that seen in various acute lesions of the intestine—lesions varying from acute

septic inflammations of the intestinal walls to the necrotic changes of advancing gangrene.

The contents of the gall-bladder are usually dark in color, purulent, puriform, or hemorrhagic. In most cases the gall-bladder contains bile recently changed. It is usually dark green, and contains mucus and blood. Odor is generally absent, except in complete gangrene.

The presence of a clear fluid, of a white fluid, or of a simple mucus is not to be expected in the acute inflammatory cases. Such a fluid is almost invariably aseptic, like bile itself.

The mucous membrane on the inner surface of the gall-bladder is acutely congested—bright red, dark red, brown, dark brown, green, light green, dark green, hemorrhagic, or gangrenous. In many instances the mucous membrane resembles the interior of an acutely inflamed appendix. If not a necrotic process, it is the beginning of one, sufficiently established to substitute a green or a black for the normal color. Drainage is usually followed by restoration of the mucous membrane to its natural appearance. Often the supernatant fluid is comparatively light in color, the lower portions dark or purulent.

In all the acute inflammations of the gall-bladder that have come under my observation, easily separated adhesions have attached the gall-bladder firmly to all contiguous structures. In such cases the septic process has passed through the gall-bladder walls, even though gangrene has not been present. The inflammation, after a few days, results in a considerable thickening of the wall, with so much friability that stitches easily tear out. In some instances a bulging of the internal layers of the gall-bladder through the serous surface will be seen here and there. These bulging areas indicate a threatening rupture, and are due to necrotic changes in the bladder-walls.

Surrounding viscera—the hepatic flexure of the colon, the transverse colon, the duodenum, or even the stomach—may share in the septic process. The peritoneum of these surfaces is reddened, finely granular, and adherent.

Such are the usual anatomical appearances as observed upon the living by the surgeon. They doubtless differ materially from those seen at the autopsy-table.

The anatomical situation of the gall-bladder influences materially the extension of infections. The viscera in direct contact are the duodenum, colon, omentum, liver, and kidney, and sometimes the stomach. In the right upper quadrant the gall-bladder is to a certain extent shut off from the rest of the abdominal cavity, and extravasations are to that extent retarded. I called attention to this isolation of the gall-bladder

in a paper on the "Surgery of the Gall-bladder," read before the American Surgical Association at Buffalo in May, 1893, as follows:[1]

"The right upper quadrant of the abdomen, containing the liver, gall-bladder, and portions of the kidney, stomach, and duodenum, is separated from the peritoneal cavity below by the transverse and ascending colon, with their mesentery. The colon is usually in contact with the abdominal wall from the ileo-cæcal valve to the splenic flexure. Extravasations will be immediately opposed by this intestinal and mesenteric barrier, which may, however, be avoided by travelling downward along the right border of the ascending colon. In extensive extravasations the fluid will easily overcome any such obstacle, but in the slow escape of bile the opposing surface will be sufficient to prevent, by rapid adhesion-formation, any considerable infection. Anteriorly and toward the median line the stomach and duodenum act as more or less efficient barriers; posteriorly the fluid may enter the lesser cavity of the omentum through the foramen of Winslow."

The bacteriology of acute inflammations of the gall-bladder is a chapter as yet incomplete. The bacillus coli communis, from the frequency of its presence, seems to have an important rôle in producing gall-bladder infections. It must be borne in mind, however, that this prolific organism is very apt to crowd out of notice others which have much more pathogenic importance. From the contiguity of the gall-bladder to the alimentary canal, the colon bacillus is especially liable to infect the biliary passages, though the channel of infection may be difficult to determine. Should the bacillus make its way from the duodenum through the common duct and through the cystic duct, some evidence either of its source or of its progress would necessarily exist. Such evidence, however, is rarely if ever present. It must be admitted, however, that the urgency of these cases does not permit examination of the bile ducts; for the surgeon must be content with simple drainage of the gall-bladder itself. The rapid relief of symptoms afforded by drainage would seem to indicate that no general biliary infection exists.

The commoner infections of the gall-bladder naturally take place by contaminations from the intestinal tract by means of those micro-organisms always present in the healthy intestine. The nidus of infection is ever present; direct channels of invasion are ever patent; yet in some instances an infection takes place through the malign influence of bacteria that do not exist in the body in a state of health. Such, for instance, is the infection of the typhoid bacillus in patients seemingly

[1] Annals of Surgery, 1893, vol. xviii. p. 388.

well. Infections by the diplococcus of pneumonia may take place in the gall-bladder without involving the lungs or other organs. Indeed, this organism may invade the peritoneum, the appendix, the pericardium, as well as the gall-bladder, without affecting the lungs at all. Such infections have been recently observed at the Massachusetts General Hospital. In one case there was a fatal general peritonitis in which pure cultures of the diplococcus of pneumonia were obtained. Mixter has recently operated upon a case of appendicitis in which the appendix was perforated and gangrenous, and in which pure cultures of the diplococcus were found. In one of the cases here reported the gall-bladder had been infected by this micro-organism; in another by the typhoid bacillus. These clinical observations throw some light upon the question of the diversity and the malignancy of such bacetria; they suggest the possibility of a remote bacterial origin in obscure cases; they confirm the theory that in the comparatively healthy body a great variety of pathogenic bacteria may be present, ready to implant themselves upon an inviting field.

In Case IX. the typhoid bacillus was found. The disease had not been suspected; no case of typhoid had been known in the community in which the patient lived. It was only after careful questioning that a semblance of typhoid history could be obtained. Yet the culture showed a micro-organism which withstood the most rigid tests. The influence of the different forms of infection is not manifest from any observations that I have been able to make; those from the colon bacillus, the typhoid, the pneumococcus, did not differ materially; those from the typhoid and the pneumococcus were, perhaps, less fulminating than those from the colon bacillus. In the fatal cases the cultures either were lost or were not taken. Further observations in this interesting class of visceral infections are necessary.

The symptoms of an acute cholecystitis, as I have observed them, have been those of a confined abscess at the border of the right costal cartilages in the vicinity of the tip of the tenth rib. They may be those of an acute inflammation of the vermiform appendix situated near the liver; they may be those of an acute intestinal obstruction; they may be those of the sudden closure of an organic intestinal stricture; they may suggest an inflammatory process in a diseased kidney, an acute pancreatitis, an extravasation from the stomach, a malignant abdominal tumor, a tumor with a twisted pedicle.

In acute cholecystitis of whatever origin, pain is the first, the most important, the most invariable symptom. It is usually severe and paroxysmal. It is situated in the right half of the abdomen, though not always localized in the region of the liver; it may be in the normal situation of the gall-bladder; it may be in the epigastrium, or

it may be referred directly to the usual seat of the vermiform appendix. In many cases the pain becomes localized in the region of the gall-bladder; in a few it persists in areas remote from the liver. With the onset of pain are other symptoms of bacterial infection—nausea, vomiting, rise of pulse and temperature, prostration, distention of the abdomen, rigidity, general tenderness becoming localized, or localized tenderness becoming general. Often the symptoms are strongly indicative of a general peritoneal infection. Chill may or may not be present. Jaundice is seldom seen, unless the infection involves the bile duct. Vomiting, an almost invariable symptom, may be intermittent and transitory, or may be persistent. As a rule, the initial violence subsides, and the vomiting, which was at first excessive, becomes slowly diminished, to reappear, however, in case the infection becomes general. Tenderness is always found, and is generally more extensive than the lesion would seem to indicate. In this respect acute cholecystitis resembles appendicitis. The temperature is moderately high, and the pulse seldom over 100. In this disease, however, as in other peritoneal infections, the temperature seems to depend largely upon the character and virulence of the micro-organism—some causing mild constitutional reaction, others violent. The rate and quality of the pulse are reliable guides to the depth of constitutional depression. The temperature indicates an infection of some kind, but is less to be depended upon than the pulse. As in some general infections of the peritoneum, a hopeless lesion may be present with a temperature and pulse practically normal, so in acute infections of the gall-bladder the constitutional disturbance is no infallible indication.

The bowels are unaffected for the first hours of the attack. They may be unaffected throughout; yet in a certain number of cases there is complete stoppage of gas and feces. Such a condition is owing, not to a general peritonitis with intestinal paresis, but to some other cause. In three of the following cases the symptoms were such as to suggest very strongly an acute obstruction. In two of the few cases of cholecystotomy reported in the last ten years, one by Lane[1] and one by Murphy,[2] there were symptoms of acute obstruction. In Lane's case an acute obstruction was supposed to exist; in Murphy's an acute cholecystitis. Both were acute infections of the gall-bladder, and both recovered after drainage.

The symptoms of acute obstruction may point, however, toward the seat of the lesion, which, on exploration, will prove to be the gall-bladder. Yet, occasionally, as in Case I., the obstructive symptoms do

[1] Lancet, 1889, vol. i. p. 411.
[2] Twentieth Century Practice, vol. ix. p. 781.

not indicate in the least the point of stoppage. The cause is hard to tell. Lane attributed it to the paralyzing effect of the inflammatory exudate upon the hepatic flexure of the colon, with resulting paralysis; for beyond this point the colon was collapsed. In Case V. the autopsy showed a constriction at the hepatic flexure, caused by an inflammatory exudate. In the two other cases of apparent obstruction there was a peritonitis involving the whole right upper quadrant. The symptoms may have been owing to the paralyzing effect of the infection upon the contiguous coil. With the constipation of gas and feces there may be violent peristalsis and loud borborygmi—symptoms strongly confirming the possibility of an acute obstruction. Rigidity of the abdominal wall is present in the early stages of the initial peritonitis. This rigidity is right-sided, and soon accompanied by distention. As the infectious process becomes more firmly localized, the rigidity slowly disappears, until a swollen and tense gall-bladder can be felt. Often the distention persists or increases, so that the gall-bladder, masked at first by the abdominal rigidity, is later too deeply buried for palpation.

The distended gall-bladder can sometimes be felt in its normal position; in a certain number it cannot. Failure to palpate the tumor may be owing to the rigidity or to the distention; it may be owing to an unusual form of enlargement, by which it is more or less covered by the stomach, duodenum, or colon. When enlarged, lobular, and in contact with the abdominal wall, it can usually be felt, though not always, even when there is excessive distention.

In unfavorable cases, or in cases in which operation has been too long delayed, the symptoms of general peritonitis supervene. Fortunately, for reasons already given, the infectious process is successfully limited to the right upper quadrant, unless the gall-bladder wall suddenly gives way and floods with its septic contents the whole peritoneal cavity.

A correct diagnosis of acute cholecystitis may be extremely easy; it may be extremely difficult; it may be impossible. When it complicates typhoid fever, pneumonia, or cholelithiasis, the true nature of the lesion is of course at once suggested. The detection of a tender tumor close to the liver, at the usual seat of the gall-bladder, after an attack of sudden pain, nausea, vomiting, with rise of temperature and pulse, makes the diagnosis almost certain. It is necessary, however, to discriminate between the tumor of an inflamed gall-bladder, an appendicular abscess high up, a pyonephrosis, a subphrenic abscess, a suppurative pancreatitis, a localized peritonitis from gastric or duodenal extravasations caused by ulcers or foreign bodies. Symptoms appearing in persons of previous good health in whom, if suspected, gallstone symptoms have been transitory and slight, or in patients absolutely without a previous gallstone pain,

point to the gall-bladder with certainty only when the tumor is, from its position, shape, and relations, undoubtedly a gall-bladder—that is to say, when it is smooth, well-defined, rounded, moving with the movements of the liver. When the tumor is immovable, indistinctly outlined, its dulness gradually lost in a surrounding tympany, when, in other words, it is an indistinct mass buried among the viscera of the right upper quadrant, and especially when the surface of the abdomen over the tumor is adherent and reddened, its true nature admits only of conjecture, unless a history of gallstones can be obtained. Such a history, no matter how vague, should incline toward cholecystitis. On the other hand, the confounding lesions have each its suggestive history. A correct discrimination cannot always be made, however. In fact, in some cases nothing more than an indefinite inference can be drawn. Moreover, many cases are so urgent that exploration cannot be deferred for a careful study of the case. I have seen, for instance, several tumors dependent upon conditions of great rarity close enough to the gall-bladder area to be readily confounded with a gall-bladder. Not to mention the ordinary subphrenic abscess, I have seen five cysts of the pancreas, an epigastric abscess probably pancreatic, a pancreatic hemorrhage with tumor, two cases of abscess about the pylorus and duodenum —one owing to a safety-pin sticking through the pylorus; the other to a collection of gum in the stomach, swallowed from time to time by a neurotic girl. In none of these cases could the gall-bladder have been positively ruled out as a possible cause.

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An exact discrimination between such infections is not indispensable, for the indications for interference will guide the surgeon to the lesion, whatever it may be.

The case is different when the symptoms are so indefinite that we can only guess from what quarter of the abdomen the infection proceeds—whether from a gall-bladder or a normally-seated appendix; when they point quite as clearly to an acute intestinal obstruction as to an acute cholecystitis. It is at times impossible to discriminate between acute cholecystitis and inflammation of the vermiform appendix. It is not strange that confusion should arise between these two infectious processes, for in many ways they are alike: the nature of the infection is the same; the relation to the peritoneal cavity the same; the symptoms of rigidity, of general tenderness, of distention the same, and the constitutional infection the same. Moreover, the bacterial influence is often identical. The only discriminating signs of importance are the situation of the pain and tenderness and the presence and seat of the tumor.

In the three cases supposed to be appendicitis the symptoms were ap-

parently so clearly appendicular in their origin that the incision was made over the appendix. The cardinal symptoms of appendicitis were present—pain, vomiting, tenderness over the appendix, fever. In two there were right-sided rigidity and distention. In none could any tumor in the gall-bladder region be felt, even under ether; nor could any resistance or cake be detected in the region of the appendix. The absence of perceptible tumor does not disprove appendicitis any more than it does cholecystitis. In none of these cases was there a history pointing in the least toward gallstones. An exact discrimination was therefore impossible. Could the cases have been watched from the beginning, with the idea that the lesion might be in the gall-ladder, it is possible that a more accurate localization of the initial infection might have been made. The difficulty of diagnosis under such conditions will be generally admitted.

In other instances the symptoms may not indicate even the half of the abdomen involved. Pain, vomiting, distention, constipation, paroxysmal peristalsis—visible distended writhing coils, without tumor or other localizing signs—these symptoms point toward an acute intestinal obstruction of uncertain origin; they may be appendicular, peritoneal, intestinal, pancreatic, cholecystic—they may be from a general peritoneal infection; they may be from an acute mechanical obstruction. In the absence of a history pointing, no matter how indirectly, to the appendix, the intestine, the pancreas, or the gall-bladder, the diagnosis is too uncertain to guide the exploring incision. In two of my cases of acute cholecystitis, in which acute intestinal obstruction was suspected; a tumor was present in the region of the hepatic flexure of the colon; in one there was no guide. In the two former the lesion was at once discovered and treated; in the last a serious preliminary search could not be avoided.

The chief importance of an exact diagnosis in these lesions is for the selection of a suitable incision. When the symptoms point more to the gall-bladder than to the appendix, the incision should be made over the gall-bladder; when to the appendix more than to the gall-bladder, it should be made over the appendix. When the operator is in doubt as to which organ is affected, the cut may be made over a not uncommon situation for the appendix, behind the cæcum, high up. The opening will then be made about half-way between the ordinary situation of the appendix and the gall-bladder, to be enlarged in either direction as the information gained may determine. Whenever the symptoms are general—when there is neither a persistent pain nor a localized tenderness; when there is no tumor; when there is no history pointing to a definite lesion—the incision must be made in the median line.

The treatment of an inflamed gall-bladder consists in so draining that viscus as not to infect the surrounding peritoneum. As soon as the gall-bladder is well exposed, all the points about it should be packed abundantly with gauze. The tension should then be relieved by aspiration. The next step consists in suture of the fundus of the gall-bladder to the abdominal wound. The gall-bladder is then either freely opened and washed out with sterile water, or it is carefully wiped with sterile gauze. Gallstones are removed, if any are present, by the use of suitable instruments. A pliable rubber tube should then be passed to the bottom of the gall-bladder, accompanied by a strip of gauze. The external wound should be closed, except just below the gall-bladder, where a small strand is left between it and the duodenum. Further exploration should not be made. A gall-bladder hopelessly necrotic should be removed.

In almost every instance of acute inflammation, and, in fact, in almost all cases of chronic inflammation of the gall-bladder with closure of the cystic duct, drainage is followed in the course of a few days by an abundant flow of bile through the cystic duct. After drainage the duct becomes pervious, either from alteration in the shape of the gall-bladder or from subsidence of the acute inflammatory process. The operator may expect, almost without exception, to see in the course of thirty-six or forty-eight hours, bile appear through the drainage-tube, even if the gall-bladder has no bile whatever in it at the time. With the subsidence of the inflammation of the gall-bladder and of the cystic duct, the gall-bladder resumes its functions as a reservoir; it empties itself from time to time through the cystic duct to carry on digestion; the opening in the fundus of the gall-bladder gradually closes, and the patient is fully restored to health.

The prognosis in acute inflammation of the gall-bladder is grave; with timely interference it is highly encouraging. In most of the cases that I have operated upon recovery has followed. What the course would have been had the cases been left to themselves it is impossible for me to say.

From the rapid extension of the gangrenous process and its necessarily grave consequences when operation is not resorted to, from the fatal results observed even after operation in cases far advanced, I cannot but think that the outlook is extremely serious, and that acute cholecystitis demands interference even more strongly than appendicitis. In cholecystisis, as in appendicitis, some varieties are more serious than others. Those in which the process does not destroy the integrity of the gall-bladder wall may result in empyema, or in a gradual subsidence of the inflammation, absorption of the septic fluid, and permanent con-

traction of the gall-bladder; those in which a necrosis of the gall-bladder ensues must be regarded as essentially fatal.

CASE II.—H. A. W. This man, aged forty years, I saw on Thursday evening, February 8, 1894, with Dr. Davis, of East Somerville, Mass. At 12 o'clock the night before he had been seized with pain in "the pit of the stomach." There had been no indiscretion of any kind. At 10.30 Thursday morning he began to vomit, and vomited all through that day until my visit. The vomitus was at first yellow, then coffee-colored.

Five years before he had had "inflammation of the stomach," never before or since. He had been a very strong and healthy man. The attack of inflammation of the stomach was accompanied by continuous vomiting and a good deal of pain.

The temperature on the morning of the attack (Thursday) was at 97°, where it remained until after the pain ceased. The pulse was 60. At 6 P M. the temperature was 100°. About 6 o'clock he vomited, and the pain suddenly ceased. The pulse, however, continued to rise, and vomiting recurred. At 9 o'clock the temperature was 100°; at 11.15, 101°. The pulse was 108, of poor quality.

The general appearance of this patient was unfavorable; his color bad. The abdomen was distended and rigid; the skin circulation sluggish. No tumor could be made out. The tenderness was general, but more on the right than on the left. The lesion was supposed to be appendicitis, with a general infection. A grave prognosis was given.

The incision was made midway between the appendix and the gall-bladder. The appendix was found to be deeply buried in old adhesions, and inseparable except with great difficulty from surrounding structures. There was no evidence of recent appendicitis. The region of the gall-bladder was next explored; here a globular tumor could be felt adherent by easily separated adhesions to the contiguous viscera. The cut was extended upward, and the gall-bladder explored. The edges of the gall-bladder were sewed to the abdominal wound, and the contents drained. No gallstones were found. The patient made a good recovery, in spite of the unfavorable prognosis.

Cultures from the contents of the gall-bladder showed the bacillus coli communis.

CASE III.—On Saturday, August 24, 1895, I saw Mrs. E. J., aged sixty-one years, a patient of Drs. Howe and Pillsbury, of Newburyport. She had never had any sickness until the present attack, which began on Tuesday, with pain in the abdomen, though she had been complaining for about two weeks that the abdomen was sore. When the soreness in the abdomen first came on she took some kind of cathartic. She had been inclined to constipation, for which she had been in the habit of taking physic.

The pain became so severe by Thursday that she sent for medical aid. Dr. Pillsbury found her suffering with severe paroxysmal pain in the right side of the abdomen. There was nausea, with vomiting of small quantities of bile. The temperature on Friday morning was slightly above normal; on Saturday morning, 101°. A tumor filling the right

side of the abdomen had been discovered on Thursday as soon as the pain had become fully controlled by an opiate.

The family history was decidedly phthisical, most of the relatives on the mother's side having died of consumption. The bowels had been completely constipated. Two quarts of soapsuds had been injected without effect. The urine was normal. Nothing unusual in the way of food had been taken. The pain had been controlled by morphia, taken hypodermically and by the mouth. I found the abdomen distended and tender. The right half was filled with a tense and extremely tender tumor, the dulness of which was continuous with that of the liver. The whole abdomen was rigid. The patient was in great pain.

Careful questioning failed to elicit any symptoms of previous gall-stone colics, of gradual invasion of malignant disease in any form, of obstructive lesions or their causes, of renal or pelvic disease. There had been no loss in weight, no typhoid fever or dysentery, no intestinal colic, no pelvic symptoms, no abnormal sensations in the abdomen, no rupture, no bunches. It was clear that a grave abdominal emergency was present, the chief indications of which were indefinite pains for two weeks, increasing to violent paroxysms, obstipation, vomiting, abnormal distention, right-sided tumor.

There were considered acute and chronic obstruction, tumor with twisted pedicle, inflammation of the gall-bladder, abdominal abscess, and appendicitis. No diagnosis was made. I was inclined to believe it to be a tumor with twisted pedicle. Under ether a smooth, round tumor could be felt in the region of the ascending colon. The tumor was conical, and pointed downward. It seemed, then, likely that there was a malignant growth of the intestine causing obstruction. Appendicitis was not seriously considered. The abdomen was opened immediately by an incision beginning at the usual seat of the appendix. The tumor was found te be a distended gall-bladder containing about a hundred faceted gallstones. The gall-bladder was everywhere adherent by recent inflammation. It contained about a pint of bile, having a peculiar, sweet odor. The edges of the gall-bladder were attached to the abdominal wound, and a large drainage-tube fastened into the gall-bladder.

In this case the bedside impresssion was strongest in favor of a mechanical obstruction suddenly developing in the course of slowly increasing malignant obstruction. The temperature, to be sure, was indicative of a septic process, but the temperature has, as a rule, little significance in acute abdominal lesions. It was clear that some acute emergency was present, and that exploration was imperative; a diagnosis, however desirable, was of secondary importance.

The patient made a rapid convalescence, and has been perfectly well ever since. No bacteriological examination was made.

Case IV.—February 7, 1894. Mrs. W. B. J., aged seventy-four years, a patient of Dr. H. W. Boutwell, of Manchester, N. H., had had for five years an obscure trouble in the abdomen which had been regarded as a floating kidney, or a malignant tumor, etc. Three months before I saw her she had complained of a sharp pain in the right side. Dr. Boutwell had found a small, rounded, painful tumor. The pain was so sharp that it "took her breath away." There was no fever. When the bowels were full of gas the bunch was more painful. Before

this trouble began she had been a remarkably strong woman. Five weeks before my first examination she had renewed pain, with vomiting and dizziness. During the winter she had lost considerable weight. There was no jaundice. I found a tumor in the right side of the abdomen, about at the level of the umbilicus, not far outside of the right linear semilunaris; it was hard, smooth, and tender. There was some tympanites over it, and the gurgling of gas could be heard going by it. The borders of the tumor were blended into the surrounding parts. The pulse was 82; the temperature normal. The intestinal coils could be seen contracting under the thin abdominal walls.

In view of the progressive emaciation, the situation of the tumor, the exaggerated intestinal peristalsis, the gurgling at the seat of the tumor, the loss of weight, and the absence of temperature, it seemed probable that this was a case of malignant tumor involving the ascending colon. An exploration was undertaken, however, because of the uncertainty of the diagnosis.

The tumor was exposed by separating the intestines and lifting the ascending colon. It proved to be a dilated gall-bladder with thickened walls. The contents were yellow pus. The woman made a good recovery from the operation, and did fairly well for several days, when she died of exhaustion.

CASE V.—John K., aged twenty-eight years, a glazier, entered the Massachusetts General Hospital May 1, 1896. He had always been well except for lumbago. The day before entrance he awoke with griping pain in both groins. This pain grew worse during the day, so that morphia had to be given subcutaneously. The bowels moved twice. The following morning he began to vomit, and vomited all day. The bowels were moved by enema on the day of admission to the hospital. He was a large, well-nourished, well-developed man. On entrance, the temperature was 102°, pulse 108; general appearance good. The abdomen was slightly distended and rigid, chiefly on the right side. The pain was described as being over the crest of the right ilium and running into the back. There were pain and tenderness at McBurney's point. There was no dulness or cake. The case seemed to be an urgent one, and an operation was decided upon at once. The diagnosis was acute inflammation of the vermiform appendix.

An incision five inches in length was made over the usual seat of the appendix. The appendix itself was found normal, two inches in length. When the peritoneal cavity was opened there was evidence of general infection. As the condition of the appendix did not explain the obvious peritonitis, the hand was introduced. The gall-bladder was found to be tensely distended and everywhere adherent. The incision was thereupon extended to the lower costal border. The gall-bladder was dark in color and had the appearance of acute gangrene. The intestines were walled off on all sides with gauze, and the lower part of the incision was closed with silkworm-gut sutures. The gall-bladder was then aspirated, and several ounces of bloody, gelatinous bile were drawn off. The gall-bladder was then sewed to the abdominal wall and the fundus opened for the insertion of a medium-sized drainage-tube. The bladder was packed about with sterile gauze. The wound was closed everywhere except where the drainage-tube and gauze emerged.

On the next day bile escaped freely through the tube. On the third day the abdomen became distended and the patient began to vomit. An intestinal coil presenting in the wound was incised; much gas and fecal matter escaped. Death took place on the fourth day. Autopsy showed a general septic peritonitis and a gangrenous gall-bladder. There were no gallstones. The hepatic flexures of the colon were covered with fibrin, and its lumen was nearly occluded by adhesions.

CASE VI.—Major G. S. M., aged fifty-six years, Lawrence, Mass. I saw this gentleman, a stout, rugged man of great energy, on September 14, 1896, with his physician, Dr. O. T. Howe, of Lawrence, and Dr. F. W. Johnson, of Boston. He was in extreme distress. The abdomen was distended, everywhere painful and tender. There were constant vomiting and hiccough. The temperature was 103°; the pulse irregular and weak, between 80 and 100. In the region of the gall-bladder there was a tense, rounded, tender tumor. There was no jaundice. It appeared that for some six months the daughter of the patient had noticed that he did not look as well and had not acted as well as usual. On September 9th, five days before I first saw him, Dr. Johnson attended him in Boston. He was then complaining of pain in the epigastrium, a little to the right. He had been subject at times to this pain. When seen on the 9th by Dr. Howe, he was in a state of collapse. The temperature was 103°; the pulse slow and weak at 70. The body was cold and covered with sweat. The pain was intense, and required repeated hypodermatic injections of morphine, from a quarter to a third of a grain each time. The patient remained practically in this condition until I saw him on Monday, the 14th. The temperature had remained in the vicinity of 103°; the pulse had become gradually poorer in quality. On Wednesday he himself had noticed a very tender spot, hard to the touch, which he indicated was in the region of the gall-bladder. From that time his condition grew decidedly worse. In the afternoon of Wednesday he began to vomit, and the vomiting was more or less continuous until I saw him on Monday. The bowels were open on the first and second day. On Sunday the pulse was weak, rapid, and irregular; the temperature 102.5° to 103°. There were vomiting and hiccough. I made a diagnosis of acute inflammation of the gall-bladder, depending chiefly upon the situation and physical characteristics of the tumor. Although the patient was in an extremely grave condition, it seemed imperative to operate at once. The tumor was exposed by a short incision. The gall-bladder presented in the wound. It was thickened, darkly congested, friable, and everywhere adherent. There was no evidence of a general infection of the abdominal cavity. The contents of the tumor were first removed by aspiration. The gall-bladder was then incised and its edges sewed with silk to the margin of the abdominal wound. A drainage-tube was fastened into the gall-bladder, and a small amount of gauze was placed outside and below the gall-bladder wound. The rest of the abdominal wound was closed by interrupted sutures.

Though operation was a brief one, the patient stood it badly. He was put to bed, and seemed to be near his end. The respiration was shallow and hurried, the color was bad, the pulse extremely irregular; there was constant vomiting. For two or three days this gentleman

was in a very precarious condition; he then began to mend slowly and normal bile began to escape through the tube. He made a very satisfactory recovery, and was able to return to his professional work at the end of a few weeks. Cultures from the aspirated fluid showed a mixed infection of bacilli and cocci of various sizes. It was impossible to determine their nature or their source.

CASE VII.—Mrs. C. M., a patient of Dr. C. W. Stevens, of Charlestown, I saw on September 17, 1896. She was thirty-three years of age, had had one child, and was two months pregnant. There had never been any previous disease, nor had there been any unpleasant symptoms; in fact, she had always been very well.

On September 6th she was taken with cramps confined to the epigastrium, with more or less constant vomiting. There had been no rise of temperature. Dr. Stevens thought that there were symptoms of intestinal obstruction, as he was unable to move the bowels.

Following the first attack of cramps, September 6th, there had been three others. The pain seemed to go up into the shoulder-blade. There was no jaundice. There had been no previous history of pain, paroxysmal or constant.

The cheeks were somewhat flushed. The pulse was 100; the temperature 100°. The general appearance was good. Under the liver, in the normal position of the gall-bladder, there was a tender tumor, like that of a distended gall-bladder. The patient stated that she had had these cramps in the gall-bladder for a long time, but she had never been jaundiced. The abdomen was not especially distended, and was neither tense nor rigid. There was an absence of the reflex abdominal symptoms seen in the other cases. An operation for draining the gall-bladder seemed imperative, although the condition of pregnancy contra-indicated operative interference unless it was absolutely necessary.

On the following day the tumor was exposed. It proved to be a gall-bladder. The fluid was withdrawn with the aspirator. A number of gallstones were then removed. A drainage-tube was fastened into the gall-bladder after its edges had been sewed to the abdominal wound. The patient made a very satisfactory recovery. Some weeks after the complete healing of the wound the patient began to have renewed pain, with a slight rise in temperature. Examination of the scar showed a tender tumor, which was evidently due to a refilling of the gall-bladder. An opening was made through the scar, and a couple of ounces of perfectly clear fluid were withdrawn. From that time until the present it has been necessary to keep a sinus at this point. Most of the time there has been a discharge of clear fluid, which is perfectly aseptic.

The failure to find any bacterial invasion of the gall-bladder in this case removes it somewhat from the category of cases under consideration. The distention seems to have been an acute mechanical one. What would have happened in case no drainage had been attempted is problematical. On the chances, an empyema with septic infection would sooner or later have taken place. That there was some infection at the time seems probable, in spite of the failure of the bacteriological examination.

The condition of the gall-bladder in this case was not that which I usually have found in acute infectious cholecystitis, for its walls were smooth, the peritoneum was not altered, and there were no adhesions. The mucous surface of the gall-bladder was reddened and injected.

CASE VIII.—Dr. F. E. K., aged thirty-four years, I saw at Nashua, N. H., November 30, 1896. This gentleman, who was rather spare and not in especially good condition, was taken on the morning of November 29, 1896, with what was supposed by himself and by his physician to be appendicitis.

On Saturday, the 28th, he had an attack of epigastric pain, which was relieved by morphine. That night he was very restless, and had tenderness over cæcum. On the following morning he went to his office, but he was obliged to give up his work and go home. His temperature was then 101°. In the afternoon he had severe pain and tenderness over the region of the cæcum, with distention. The bowels moved well.

On inquiry I found that he had always been subject to trouble with digestion, and had often suffered pain; in fact, he had had two attacks of pain before the present one. The pain would last through the night, and was unattended by jaundice. His physician, Dr. Wallace, said that he was jaundiced after an attack of scarlatina two years before. Up to the preceding Saturday he had been attending to his work, and had been better than usual. On Saturday and Sunday he vomited, but there had been no vomiting on Monday.

I found the pulse between 96 and 100; the temperature 101°. The general appearance was good. There was extreme tenderness over the ascending colon, and also over the region of the appendix. Immediate operation was advised. The abdomen was not especially distended. Even after etherization no tumor could be felt. It was supposed to be a case of acute appendicitis, although the absence of any physical signs in the region of the appendix made it probable that there was neither perforation nor localized peritonitis. The abdomen was opened over the usual seat of the appendix, a little higher than usual. The appendix was found to be normal. Through the upper part of the incision I explored with the finger the region of the gall-bladder, and found a tense, somewhat roughened adherent tumor, which I immediately recognized as a distended and inflamed gall-bladder. The incision was then carried upward into the region of the gall-bladder. The peritoneum was dark in color, greenish, but not necrotic, and there were easily separated adhesions on all sides. Gauze was packed all about the tumor, and it was aspirated. A considerable amount of fluid was removed. The gall-bladder was then opened, and from it were removed a number of large, irregular gallstones. A drainage-tube was placed in the gall-bladder with a small amount of gauze, and a little provisional packing was placed under the gall-bladder as in the other cases.

The patient made an uninterrupted recovery and remains well.

CASE IX.—Mrs. C. P., aged fifty-nine years, was seen March 5, 1897. This case of cholecystitis proved to be an infection by the typhoid

bacillus. The history obtained from Dr. Chandler, of Townsend, the attending physician, was as follows:

Twelve days before my visit the patient had had an attack of acute cystitis. The spasmodic pains in the bladder were entirely relieved by treatment. The temperature was at all times elevated. With the last menstrual period there was a decided rise in temperature without increase in bladder symptoms. The general appearance was bad. Two days before my first visit she began to have pain with tenderness in the right iliac fossa. The temperature was 103.2°. The pain and tenderness were over McBurney's point, from which the pain radiated. There was some nausea. The temperature and pulse continued elevated. The pain was controlled by opium. On the day of my visit the temperature was 99.4°; pulse 80; the tenderness less. She had always been in very good health, and was of good constitution. During the past winter she had been complaining of the stomach. She had not looked as well as usual, but had lost no weight. Had never been jaundiced, and had had no attacks of pain. No history whatever of gallstones could be obtained. A tender tumor in the region of the gall-bladder or right kidney could be made out, but very indistinctly. The general condition was good, though the pulse was small and feeble. Operation was not advised. Three weeks later I saw her again. She had been having a good deal of pain and fever. The tumor had increased in size; it was elastic and fluctuating, exquisitely tender, and extended from the region of the gall-bladder into the back. A diagnosis of acutely inflamed and distended gall-bladder was made, with a possibility of its being a kidney.

Immediate operation was advised. The kidney was first explored by a small lumbar cut, and found normal. The gall-bladder was next exposed and found to be distended and inflamed. It was aspirated and then drained. A cylindrical stone, with smooth sides and rounded ends, was removed with great difficulty from the cystic duct. The gall-bladder was drained by means of tube and gauze. A good recovery followed. Examination of the culture showed the typhoid bacillus. This case was published by Dr. Mark Richardson in the *Boston Medical and Surgical Journal* of December 16, 1897. A careful review of the history in the light of the culture showed a strong probability that it was a case of typhoid fever with a complicating cholecystitis. The case is here reported because the disease was watched, treated medically, and operated upon without the slightest suspicion of a typhoidal origin.

Case X.—On November 3, 1897, Mrs. S., aged sixty-seven years, a patient of Dr. Gay, was taken with severe pain in the epigastrium extending toward the left. This attack had been preceded by a few days of uneasiness in the region of the stomach. The temperature was 102°. There were vomiting and distention.

The patient had been subject to "bilious" attacks, but had never been jaundiced. The present attack was supposed to be indigestion, and little was thought of it. The next day the pain was much more severe, and was localized in the region of the gall-bladder. There was constipation of gas and feces. There were general distention of the abdomen, tenderness over the gall-bladder, and dulness in the flanks. The diagnosis of acute cholecystitis was made. On the evening of the second day the tempera-

ture had fallen to 100°, the pulse to 90—the patient was decidedly better. Operation was therefore deferred.

On the following day the pain increased in severity; the pulse and temperature rose; the abdominal symptoms were more acute. Both Dr. Gay and myself concluded that interference was imperative, and I was asked to operate, Dr. Gay being called away unexpectedly.

An extremely distended gall-bladder was found, everywhere adherent by recent exudate. It was dark in color, and contained numerous calculi suspended in a dark, hemorrhagic, turbid fluid. The mucous membrane was dark gray and œdematous. The gall-bladder was drained with tube and gauze. Fully as many gallstones escaped through the tube as were extracted at the time of operation. The patient made a good recovery, and remains well. Cultures taken from the gall-bladder showed numerous bacteria of different kinds, which were supposed to be contaminations, so that no conclusions could be drawn as to the nature of the infection in this case.

DISCUSSION.

DR. J. M. DA COSTA, in discussing the paper presented by Dr. Maurice H. Richardson, said: I really came as a listener to-night, and have very little to say; it has been a great pleasure to hear such a valuable paper. A few matters suggested themselves, however, while listening.

The first point that struck me was the statement that the condition was invariably fatal, unless surgically interfered with, although I may have misunderstood this mark. I cannot agree to this. There is now in the wards of the Pennsylvania Hospital a patient who had acute pneumonia. Cholecystitis developed in an acute form, and with such unmistakable symptoms that there could be no difference of opinion as to its existence. There was a tumor, with jaundice and great pain, the latter being the prominent symptom before the tumor; there was no previous history of gall-stones. Most likely the pneumococci infection gave rise to the cholecystitis. After many ups and downs, and a great deal of difficulty in the treatment, caused chiefly by the gastric irritability, the woman is recovering. This is not an isolated case in my experience, as I know of other instances of undoubted cholecystitis that have ended in recovery, and I cannot, therefore, agree that it is necessary to at once resort to an operation, or that cases cannot get well under medical treatment.

Then we cannot overlook the fact that gall-bladder infection in typhoid fever is very common, and that the milder cases of cholangeitis in connection with this are constantly recovering. We find, indeed, that in the majority of instances there are no marked symptoms, and it is only when the patient dies of one of the grave complications of typhoid, such as intestinal hæmorrhage, perforation, or lung affection, that more or less inflammation of the gall-bladder is discerned. Still, there are cases in which even painful swellings of the gall-bladder, readily detected during the progress of the disease, end in recovery, and in which the cholangeitis slowly passes away. Such a case, for instance, is the well-known one recorded by Frerichs (Observation No.

LXVIII, "Diseases of the Liver"), in which a very painful tumor of the gall-bladder was found on the fifteenth day of typhoid fever, and gradually passed away.

Another matter of great interest in the notable paper we have heard to-night, quite irrespective of its surgical and therapeutic value, is the consideration of doubtful diagnostic points as regards appendicitis; in this respect, too, it adds much to our knowledge.

DR. TYSON'S remarks: In limiting the subject-matter of his paper to acute septic processes of the gall-bladder, which come on without previous warning in patients apparently well, Dr. Richardson narrows the field of discussion in such a manner that I fear very few present are qualified to discuss it from the standpoint of personal experience. I at least cannot do so, and in order that I may contribute something to the discussion I must go somewhat out of the boundary he has outlined. I have never met a case of acute cholecystitis occurring under the conditions named,—that is, without previous warning in patients apparently well. Dr. Richardson's paper will have had at least this useful result, that it will have stimulated us to be on the lookout for a condition which had previously been scarcely suggested to us.

The nearest approach to such a case, in my own experience, has been very recent, the autopsy having been made only Saturday last, April 2. I was asked to see Mr. S. by Dr. E. C. Howard in November, 1897. Mr. S. was sixty years old. His health had been failing since midsummer, when he had a perirectal abscess; but for five or six years he has been subject to attacks of pain, which were referred to the stomach. Only since September were the attacks very severe. They closely resembled biliary colic, and were so severe as to require hypodermic injections of morphine to relieve him. They were sometimes accompanied by vomiting, which relieved the pain. Sometimes they were accompanied by chills, and sometimes there were chills without pain. He was slightly but evidently jaundiced. The temperature ranged from 99.1° to 101.3° F.

The bowel discharges were carefully strained and examined with a view of finding gall-stones for some weeks, but without success. No enlargement of the gall-bladder or liver was recognized before death. There was no ascites; no inequalities could be found on the surface of the liver. He failed very slowly, in

fact kept about until a few days before his death, when he was prostrated by colliquative discharges from his bowels, after which he declined rapidly. The autopsy disclosed the liver of hypertrophic cirrhosis and a gall-bladder much enlarged, fully three times the normal capacity, and distended with a thin, yellow fluid resembling thin bile. There were numerous black, friable gall-stones and the *hepatic duct was obliterated.* The mucous membrane of the stomach was hyperæmic and injected. There were no other lesions found in the abdomen. The thoracic viscera were not examined.

The closure of the hepatic duct was so tight that a probe could not be passed through it. No bacteriological examination of the contents of the gall-bladder was made. The relation of the attacks of the pain to the obliterated duct can only be surmised. I regarded the case as one of hepatic fever. It seemed at first thought likely that the inflammation of the duct was caused by the impacted stones. On the other hand, it is more in accordance with modern views to suppose that these were the favoring cause which facilitated the infectious influence of a colon bacillus, a typhoid bacillus, or some other bacterium capable of producing infection.

The cases of cholecystitis which come to the notice of the physician are generally those which complicate typhoid fever, due to infection of the biliary passages by the typhoid bacillus, but even under these circumstances they have heretofore been more frequently met on the autopsy-table than recognized before death. Yet Louis referred to changes in the bile and gall-bladder in his work on typhoid fever, published in 1835, and not a few cases have been since reported. Quite recently the papers of Osler and of A. Lawrence Mason, both read before the Association of American Physicians in 1897, have brought the subject up to date, and will do much to attract attention to it in America. The symptoms are largely those to which attention has been called by Dr. Richardson, although they are apt to be obscured by those of the existing disease, especially by tympany, which is so frequently associated with typhoid fever. There is almost never jaundice, while the pain is often not localized to the region of the gall-bladder. Moreover, the acute pain of perforation of the gall-bladder has probably more than once been interpreted as perforation of the bowels.

The most interesting feature in connection with the disease is its resemblance to appendicitis, as illustrated by a remarkable case reported by Osler, and operated on successfully by Halsted, as well as by some of the cases reported by Dr. Richardson. Another interesting feature is the frequency of gall-stones as a predisposing cause. If it is true, as held by Chiari and Councilman, that the biliary passages are invaded in practically every case of typhoid fever, some such favoring cause as this would seem to be necessary. Pain and vomiting are quite common, while jaundice is rare, though it does occur.

The most reliable symptom is the area of dull percussion starting from a point corresponding to the end of the gall-bladder.

DR. JAMES C. WILSON, in discussing Dr. Richardson's paper, said: I must join with the other gentlemen in the feeling that Dr. Richardson has done us a great service in presenting this subject this evening. He has called attention to a condition which must be much more common than any of us have heretofore recognized, and for which, in the future, we will be more closely on the outlook. He has with great emphasis urged the necessity for surgical interference in cases of rapidly developing peritonitis, and more particularly in cases of sudden perforation. This subject seems to me not to have been sufficiently regarded in the past by practitioners at large. I think I may say that Dr. Richardson's limitation in regard to the subject is narrower than the cases he has mentioned would justify, or the subject itself would warrant. For my own part, it seems to me to exclude those infectious diseases due to pathogenic organisms which may be sometimes found in cases of acute cholecystitis, and to look upon the cases to which he has referred as occurring in people in previous good health is narrowing the subject too closely. Not only would that appear to be true of his own cases, but it would also be equally true of the large number of recorded cases that occur as sequels of enteric fever. I cannot see where the line of difference from the stand-point of diagnosis can be drawn between a case which arises under these circumstances and those which arise in individuals apparently in previous good health. In all probability there are many individuals in whom acute illness develops where there was no history of previous disease, except that they may have passed through an attack of enteric fever some years before.

It is well recognized, at the present time, that the contents of the gall-bladder during an attack of enteric fever become very often a pure culture of the bacilli, and that this bacillus is capable of a prolonged existence in the organism. This being the case, I think the limitations drawn are too strict, and I think a broader consideration of the subject may be undertaken without interfering with the facts of diagnosis, the pathological conditions, or the treatment. We should take all phases of acute cholecystitis into consideration. My own experience is limited to cases that have occurred in connection with enteric fever. Dr. Wilson briefly reported two cases of acute cholecystitis following enteric fever, recently under observation. In both recovery took place.

DR. JOHN ASHHURST, Jr., in discussing Dr. Richardson's paper, said: With regard to the adhesions often found connecting the gall-bladder and neighboring viscera, they, no doubt, are the result of previous inflammation, and it is true that we often find them where there are no symptoms of acute cholecystitis, but where there has evidently been an inflammation, acute or subacute, some time before. I operated on such a case some months ago, in which there was no evidence of existing cholecystitis, but in which the adhesions caused the gall-bladder, which was deeply seated, to be almost completely overlapped by the stomach, so that I narrowly escaped opening the last-mentioned organ. Dr. Richardson has pointed out very clearly what many of us have, of course, recognized long ago,—viz., that gall-stones alone are not a cause of acute inflammation. As a matter of fact, if a patient has gall-stones and they lie quietly in his gall-bladder, they will probably give no trouble; it is when they attempt to make their way down through the ducts that pain and other grave symptoms arise.

I was interested in Dr. Richardson's demonstration of the cause of intermittent distention of the gall-bladder, and in the comparison which he drew between it and intermittent hydronephrosis. I have thought that there was another cause for this intermittent distention, and that is the valve-like action of calculi themselves. In the case of the kidney we may have small calculi entering the orifice of the ureter, and when the pelvis becomes distended with urine, these calculi may float back like a ball-valve; and a similar condition may be present in the gall-bladder,

a gall-stone temporarily occluding the cystic duct, and then floating back when a certain degree of distention has occurred.

With regard to the frequency of acute cholecystitis, my own experience would lead me to say that it is rare, though no doubt it is more apt to come under the observation of the physician than under that of the surgeon. I can recall but one case in which I have operated for a condition of the kind which Dr. Richardson has described, and that was in a patient who, when admitted to the Pennsylvania Hospital, was manifestly extremely ill. The abdomen was distended, vomiting was marked, and the pain was intense. The symptoms seemed to point quite as much to appendicitis as to inflammation of the gall-bladder, and, in fact, I supposed the case to be one of appendicitis in which the appendix was in an abnormal position. An incision was made, and the gall-bladder was found enormously distended, discolored, and inflamed. It was opened and drained, several large calculi being removed, and the patient, after some days of extreme illness, made a good recovery.

As to diagnosis, I do not see how it can always be made. Undoubtedly, if the surgeon has the possibility of acute cholecystitis before his mind, he will be more apt to recognize these cases than he otherwise would, and I have no doubt that hereafter, in Philadelphia, our attention having been directed to this subject, they will be recognized much oftener than they have been in the past. It is certainly important that a diagnosis should be made if possible, so as to avoid preliminary median incisions, which can but add to the danger of a subsequent operation.

As to treatment, I entirely agree with Dr. Da Costa that there are cases in which the patients recover without operation, and this is sufficiently evident from the number of instances in which we find old adhesions in ordinary operations for gall-stones. But, on the other hand, I have no doubt that there are cases of infectious cholecystitis, such as have been described by Dr. Richardson, where no benefit can be expected without an operation. If I may be allowed to venture the statement, I would say that in the same class of cases in which, the disease being appendicitis, the surgeon feels that immediate exploration is necessary, the same decision should be arrived at when the affected organ is the gall-bladder. There are cases of appendicitis in which the most conservative surgeon feels that unless the patient be imme-

diately operated on he will almost surely die, and the operation may be resorted to in these cases within only a few hours of the first onset of the disease. There is something in the general condition and appearance of the patient which satisfies us that immediate operation is necessary, and I think that in the same class of cases of acute cholecystitis the same rule should apply.

As to the technique of the operation of cholecystotomy, Dr. Richardson has very properly laid stress upon the importance of stitching the gall-bladder to the abdominal wall, whenever this is possible. In some cases, however, it is impossible to bring the gall-bladder to the surface, and under such circumstances I have been obliged to rely upon packing gauze around a large unfenestrated drainage-tube left in place for about ten days.

I feel that I have added very little to the consideration of this subject, but the affection is so rare that I came here rather to learn than to take part in a discussion.

I may add that, in the case to which I have referred, the patient after the operation was in a very critical condition from that state of paralysis of the bowel, without peritonitis, with which we are all familiar. There was enormous distention with persistent vomiting, and she seemed about to die. Just at that time I had read an article recommending that under such circumstances a fresh incision should be made into the small intestine for the introduction of a purgative saline solution. I did not feel that my patient could endure a second operation of this kind, and, as no remedies could be given by the mouth, I had two ounces of Epsom salt in a saturated solution administered by enema. This produced a large discharge of flatus followed by a fæcal evacuation, and the patient's progress towards recovery seemed to begin from that moment.

DR. JOHN B. DEAVER, in discussing Dr. Richardson's paper, said: I desire to express my pleasure at having an opportunity to hear Dr. Richardson's paper. That the initial disturbance in the class of cases to which Dr. Richardson refers is a catarrhal condition, I have no doubt, and that, as a result of the catarrhal disturbance, micro-organisms normally found here are capable of exercising deleterious effects resulting in the type of inflammation referred to. While it is a well-known fact that bile has escaped into the peritoneal cavity during operation without occasioning peritonitis, in the presence of a catarrhal inflammation of

the bile-passages, the bile is no longer sterile, therefore, capable of exciting inflammation of the peritoneum if brought in contact with it. It has been demonstrated by experiments that the aseptic properties of normal bile is slight. In the presence of disease of the gall-bladder or bile-ducts, the bile always contains micro-organisms. When the flow of bile along the ducts is interfered with, micro-organisms invade the gall-bladder either from the blood or intestines; the latter has been demonstrated by ligaturing the common duct. Netter, in 1886, demonstrated that twenty-four hours after aseptic ligature of the common duct staphylococci and the common colon bacillus could be cultivated from the bile.

The common colon bacillus exists normally in the human body in every part of the alimentary canal, from the mouth to the anus, and in the normal condition of the same is harmless. When the intestines or any of its offshoots become the site of morbid conditions then the colon bacillus may become at once virulent. That simple empyema of the gall-bladder is due to inflammation in which pyogenic organisms play an important *rôle* is true. From a clinical stand-point empyema of the gall-bladder may be considered under two headings, that of simple empyema and, the more serious form, phlegmonous inflammation of the gall-bladder.

Simple empyema may result from the extension of a catarrhal inflammation, or from irritation in the cystic duct, or may be associated with suppurative inflammation of the remaining ducts of the biliary apparatus; the latter being, however, an extremely serious affection for which operation promises most. The constitutional symptoms in simple empyema are slight in comparison with those of the more serious form. There is usually increase of temperature, increased pulse-rate, nausea, and localized tendeness, due to local peritonitis, rigors or chills. As a rule, there is no jaundice, unless there is an associated catarrh of the bile-ducts. If the case be seen early and a tumor be present, it will be felt to move with respiration; the inflammation going on, the tumor sooner or later becomes anchored as it were. If the gall-bladder is not drained by the surgeon, nature may interfere and accomplish drainage through the umbilicus, the pus being guided to the latter point by the suspensory ligament of the liver, find its way beneath the ribs, in this wise simulating a subdiaphragmatic

abscess, or the pus may be evacuated through an ulcerative communication with a neighboring coil of bowel. Operation in the presence of a gangrenous gall-bladder calls for extirpation of the gall-bladder.

Acute phlegmonous cholecystitis, as in simple empyema of the gall-bladder, is caused by micro-organismal invasion. Acute phlegmonous inflammation of the gall-bladder presents symptoms much more serious than does the simple variety of inflammation. The tumor makes its appearance suddenly with most acute pain, at first referred to the right side of the abdomen but rapidly becoming general. The pulse is rapid and feeble, breathing quick and thoracic. There is high temperature, great depression, marked tenderness on pressure at the site of the gall-bladder. Jaundice may or may not be present, usually not. The condition most frequently mistaken for this trouble is acute gangrenous appendicitis. Relief is afforded only through operative interference. Acute gangrene of the gall-bladder is only an exaggerated condition of a cholecystitis. The predominating pathological condition being the absence of drainage, thrombosis of the nutrient vessels, which is true in the case of acute gangrenous appendicitis. In dealing with this class of cases, the condition most likely to be confounded with it is acute appendicitis. The differentiation between the two conditions, acute cholecystitis and acute appendicitis, in the majority of instances, is capable of being made. The onset in both is sudden, the pain acute, etc. The points in favor of cholecystitis are the location of the pain being higher, the rigidty confined more to the upper right quadrant of the abdomen, the vomiting being more persistent, and the presence of rigors or chills. In acute appendicitis chills are never present, except in the acute gangrenous variety. Again, the difference in the location of the pain, the extreme tenderness, the degree and difference in location of rigidity, the absence of so pronounced constitutional symptoms, except in the acute variety of gangrenous appendicitis, should enable us, as I have already said, in the majority of cases to reach a correct conclusion.

The association of the two conditions, acute cholecystitis and acute appendicitis, has occurred in my experience. One of the cases which I recall distinctly was that of the wife of a physician, in which the appendix was removed and the gall-bladder drained; the recovery was uneventful.

When a tumor is present, it is sometimes impossible to say definitely whether it is one of the kidney or of the gall-bladder. Where the tumor is an enlarged gall-bladder and anchored by adhesions, thus not allowing its being pushed back into the flank space, the differentiation is much less difficult than under the reverse condition. Simple acute cholecystitis, in my experience, is not necessarily fatal if not interfered with surgically. I believe, however, that all of these cases should be operated upon. Cases which I have seen recover without operation, like cases of appendicitis supposed to recover without operation, but which never permanently recover unless operated upon, are left with adhesions, etc., thus occasioning trouble from time to time, which discomforts the patient to say the least.

Cases of acute phlegmonous cholecystitis, I am of the opinion, should be operated on most promptly, which, I believe, promises the patient his or her only salvation for recovery.

It will not be out of place for me to say here that I am equally strong in my belief that cases of obstruction of the biliary passages from gall-stones are not operated early enough. That an impacted gall-stone may excite irritation to ultimately occasion a malignant growth, I am also certain of.

The mortality following operation in acute intra-abdominal inflammation, particularly of the gall-bladder and the appendix, if done early, by which I mean within a few hours of the onset of the attack, is practically *nil.* The deaths following gall-bladder inflammation, in my experience, have been in those cases where the patients have been markedly jaundiced, under which circumstances the broken-down blood necessarily favors free bleeding, and gives us great anxiety as to the outcome of the case. In the latter class of cases I have seen blood vomited, passed in stool and in the urine, the result of the blood dyscrasia.

Dr. Richardson cites some cases in which adhesions are very troublesome to deal with, but, as a rule, however, they are easily disposed of.

The point the doctor makes concerning the position of the gall-bladder is important. Recently the writer operated upon a case which illustrated this condition very well. The gall-bladder, occupying a position distant from the anterior abdominal walls, excited comment from the physicians witnessing the operation, they remarking that the gall-bladder was much more accessible.

The anatomical position of the gall-bladder and the arrangement of the peritoneum in this neighborhood explain the presence of biliary fistula occurring at the site of the anterior iliac spine, or, in short, the lower abdominal wall, the result of overlooked gall-bladder suppuration.

There are one or two points in connection with the technique of the operations upon the gall-bladder or the gall-passages to which I will venture to call attention. The importance of isolating the field of operation by the proper disposition of gauze. The establishment of a biliary fistula by stitching the walls of the gall-bladder to the parietal peritoneum and the aponeurosis of the external oblique muscle, thus not bringing the walls of the opened gall-bladder flush with the skin. In the cases where drainage is not indicated closing the gall-bladder, dropping it into the peritoneal cavity.

In closing, I would beg to say that I have not referred to the operation of cholecysto-enterostomy, as personally I believe that in the majority of instances this operation is only a make-shift, and that radical interference should always be preferred.

Dr. L. McLane Tiffany, of Baltimore, in discussing Dr. Richardson's paper, said: What has been said by Dr. Richardson it seems to me would be much more important if it were made a little more general. I think that many of the cases, at the present time, which we are able to recognize as cholecystitis are the sequelæ of some pre-existing trouble, such as enteric fever. Where there has not been some previous disease the cases have been much more rarely recognized than they will be in the future. I am not sure but that Dr. Richardson will shortly be placing the ovary, gall-bladder, and appendix in one operative class.

It has been my fortune to operate on a case of acute cholecystitis followed by acute infiltration of the omentum, which latter was four inches thick. The patient, in apparently good health, was taken suddenly ill, and the diagnosis of probable appendicitis was made by his physician. When I saw him the pain was in the neighborhood of the liver; operation showed inflammation of the gall-bladder, which was contracted and gangrenous, and a much thickened omentum. The patient died of acute sepsis on the third day. I have seen as many as five or six acute attacks not going on to the extent of a phlegmonous inflammation, but which were recovered from without operation, save in two cases.

The diagnosis was always very plain. I do not think that inflammation of the gall-bladder is to be considered as something by itself, but it should be considered as a possible thing for the gall-bladder to be infected by organisms which give rise to the acute inflammatory troubles elsewhere. The symptoms are often identical with appendicitis and with acute inflammation of the small bowel, and I do not think there is any difference in the symptoms clinically between an acutely inflamed gall-bladder, an acutely inflamed appendix, an acutely inflamed diverticulum, and a markedly inflamed small bowel. The clinician is not at present able to make a diagnosis in all cases. The presence of gall-stones has been noted in inflammation of the gall-bladder; on two occasions I have opened the gall-bladder for inflammation, and found a pure culture of the colon bacillus with gall-stones. In a certain number of cases the colon bacillus is present without the gall-stones. I suggest aspiration of the gall-bladder with the intention of finding out, while doing other operations, if an apparently normal gall-bladder is sterile. After aspirating a Lembert stitch would close it without having any serious result to follow.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, May 2, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

INTRAPERITONEAL RUPTURE OF THE BLADDER.

DR. JOHN ASHHURST, Jr., reported the case of a man who had been injured by a fall while drunk, and who had a small wound on the right side of the scalp, to close which two sutures had been introduced. There was a small area of abdominal ecchymosis, and the abdomen was distended, tympanitic, rigid, and tender, the swelling extending almost from the pubes to the chest.

There was dulness laterally in both flanks, with acute pain throughout the abdomen. No urine had been passed since the accident, and the bowels had not been moved. The resident physician had introduced a catheter and had drawn off about three fluidrachms of a dark-red fluid, which contained much blood. The diagnosis of rupture of the bladder was made, and was confirmed by the introduction of sterilized water to the amount of four fluidounces, only a few drops returning through the catheter.

The patient was then etherized and placed in the Trendelenburg position, the rectum being distended by means of an inflated india-rubber bag. The abdomen was opened by a median incision, a large quantity of fluid being found in the peritoneal cavity. When the fluid escaped, a large irregular opening was seen in the fundus of the bladder, extending also into its anterior wall, the rupture thus being both intraperitoneal and extraperitoneal. The vesical wound was carefully closed, interrupted Lembert sutures of silk being used for the intraperitoneal part, while a continuous suture was employed for the remainder. The abdominal cavity was then washed out with normal salt solu-

tion, and the external wound closed, a glass drainage-tube having been introduced and lightly packed around with iodoform gauze.

A soft rubber catheter was introduced into the bladder and retained in order to prevent urinary accumulation. The pulse became rapid during the operation, and shortly afterwards the temperature was recorded as 98° F., the pulse 120, and the respirations 42. The highest temperature was recorded three days later, just before death, when it rose to 105°. The tube in the abdominal cavity was cleansed every half hour. The patient was given strychnine and digitalis hypodermically and carbonate of ammonium by the mouth. The fluid removed through the tube at each cleansing amounted to about two teaspoonfuls, and urine was passed freely through the catheter.

The next day the patient had some cough, with pain in the abdomen, and he complained of thirst. On the second day milk was given in small quantities. The patient passed a good deal of flatus, and for the first forty-eight hours the abdomen remained quite scaphoid, but subsequently began to swell. The night before death he vomited some green fluid. An evacuation of the bowels was secured by an enema of magnesium sulphate, but the abdominal distention continued; the patient became delirious, and death followed at the end of three days.

Dr. Ashhurst referred to the rarity of uncomplicated rupture of the bladder, and said that there were probably not more than 150 cases on record; rupture of the urethra was much more frequent. Rupture of the bladder is almost always due to external violence, the viscus being distended at the time, and sometimes may be caused by counter-stroke, as by a fall on the buttocks. Bartels's statistics of intraperitoneal rupture of the bladder treated without operation showed but four recoveries out of ninety-eight cases, though when the rupture was extraperitoneal the mortality was not so high, twelve patients recovering out of fifty-four.

The modern treatment by abdominal section and suture affords better results, thirty-three intraperitoneal cases thus dealt with having given thirteen recoveries, a mortality of only 61 per cent. as contrasted with 96 per cent. under the old methods; and it is interesting to remember that the first suggestion of the modern practice was due to the late Dr. S. D. Gross, the founder of this academy.

When the rupture is extraperitoneal, the treatment may consist in drainage by a catheter alone, if this can be passed immediately; or, if extravasation has occurred, by prompt cystotomy, either by a perineal opening or above the pubis.

As to the diagnosis of intraperitoneal rupture, the symptoms will suggest the nature of the case, the patient being unable to pass any water, and evidences of peritonitis being quickly developed. But the surest test is that suggested by Dr. Weir, the injection of a definite quantity of fluid, and the attempt to withdraw the same through a catheter. When no fluid is returned, the inference is that the rupture is intraperitoneal, and that laparotomy is necessary. The Trendelenburg position is of great advantage in this operation, in facilitating the exposure of the vesical lesion, and distention of the rectum is also important. When the seat of rupture is brought into view the opening should be closely sutured, as in other wounds of hollow viscera.

DR. OSCAR H. ALLIS said there was one way in which the bladder might be injured besides those mentioned by Dr. Ashhurst,—viz., the separation of one portion of the pelvis from the other. The attachments of the crura penis are such that the urethra and bladder may be torn by a separation of the sides of the pelvis.

DR. G. G. DAVIS inquired as to what means might be taken to avoid the occurrence of such peritonitis as had developed in the case reported. In all intraperitoneal operations, involving the hollow viscera, the danger of peritonitis from leakage, in spite of the most careful suturing, is very great, and the question is what can we do to guard against it. He believed a most efficient method was to isolate the seat of operation by packing, using a sufficient amount of gauze to push the intestines some distance away from the wound. Upon its removal, in thirty-six hours, a passage is left separated from the peritoneal cavity, which would provide exit for infectious material and guard against infection travelling from the bladder to the general peritoneal cavity. He was sure this method of thorough isolation of the wound would save some cases which would otherwise die of infection.

DR. GEORGE ERETY SHOEMAKER commented upon the use of the Trendelenburg position. Because of its acknowledged tendency to spread any infective fluids which may be confined by gravity to the lower abdomen, the question arises whether, in

dealing with such cases, it might not be wiser to thoroughly flush immediately after opening the abdominal cavity, pack with gauze, and then raise the patient before suturing.

It had been shown by the catheter that the bladder was empty, and no further escape from it into the peritoneal cavity need have been feared for a few minutes.

DR. DEFOREST WILLARD remembered several cases of gunshot wound of the bladder in the War of the Rebellion; all fatal.

As to lacerations of the bladder, he also remembered one case of litholapaxy, where the stone, after being grasped, moved with fair ease, but seemed to pull upon the bladder in one direction. Symptoms of rupture of the bladder developed immediately with intense pain. This was some years ago, when operations within the peritoneal cavity were not as common as they are now, but even had he opened the abdomen he would not have reached the site of the laceration. The patient died on the second day, and the post-mortem proved the existence of a rent below the line of the peritoneum and between the bladder and the rectum.

As to the great distention of the bladder, it rarely results in laceration. He remembered one case in which the bladder had been in a state of distention for four months. It contained twenty-nine pints of urine, but did not rupture, although it filled the entire abdomen.

DR. ASHHURST remarked, in rejoinder, that it was true that the Trendelenburg position had the disadvantage of allowing fluids to flow back, which was one of the reasons why he did not ordinarily employ it; but he thought that where an organ like the bladder was ruptured, the first indication was to stop the escape of its contents. To begin with washing out the peritoneal cavity, before closing the vesical wound, would not be a very successful procedure. The first indication is to close the visceral wound so as to prevent further escape of urine, and then to wash out the cavity.

As to the use of gauze packing, he did introduce gauze over the wound of the bladder. He would not suggest tightly closing the abdomen where the bladder had been ruptured, and particularly where there had been for some time an opportunity for the escape of urine.

He had been interested in Dr. Allis's remarks as to rupture of the bladder from separation of the bones of the pelvis.

Some years ago he had operated on two cases of penetrating wound of the bladder, one intraperitoneal and the other extraperitoneal, the former patient dying in a few days, and the latter recovering. Peritonitis develops very rapidly in the intraperitoneal cases, and particularly where the urine is of a morbific character. In the case he had just reported peritonitis had already developed before he saw the patient. His history adds one more fatal case to the records of ruptured bladder, but it shows what we should recognize as the proper treatment of these injuries. Even with prompt operative interference the mortality will be high, but it seems better to do whatever is possible than to abandon the patient altogether. With a record of ninety-four deaths out of ninety-eight cases from non-interference we should operate without hesitation, and with our modern methods of treatment we may hope for recovery in a fair proportion of cases.

GANGRENE OF THE RECTUM.

DR. H. R. WHARTON reported the case of Miss G., forty-eight years of age, who had been sick for a few days, when he was asked by her physician to see her, on account of some discomfort which she complained of in the region of the anus, where there was some swelling and œdema of the skin. Her temperature had been running about 102° F., and her pulse 116.

Upon examination of the patient, finding marked induration of the skin surrounding the anus, he made a long curved incision on each side of the anus, and exposed gangrenous connective tissue in each incision; he could pass his finger well into the ischio-rectal fossæ on each side of the rectum, and the rectal wall exposed in the wounds was seen to be of a grayish, leaden color, and had a gangrenous appearance. The wound was thoroughly irrigated with a 1 : 2000 bichloride solution, and strips of iodoform gauze were introduced for drainage. The patient's condition remained the same for a few days, and there was discharged from the wounds dark-colored, offensive pus, with shreds of connective tissue.

A few days later examination disclosed the fact that the lower portion of the rectum was gangrenous, and that a perforation had occurred, and that fæcal matter was escaping freely through one of the incisions; the anus and sphincter remained intact, all fæcal matter escaping through one of the wounds. The wounds were freely irrigated, a number of times each day, with a

solution of permanganate of potassium, 1 : 2000. To facilitate the escape of sloughs and fæcal matter he divided the sphincter muscle, and a few days after this a tubular slough escaped, which, on examination, was found to be about three inches of the lower end of the rectum. After this the patient's general condition improved, the fæcal matter escaping freely through the incisions, and the cavity left after the sloughing tissue had escaped was filling up with healthy granulations.

Some weeks after this the patient's general condition had very markedly improved, and she was about to be removed to the country, when, during a very warm spell of weather, she suffered from an attack of heat-exhaustion which almost proved fatal. After this she was removed to the country, but was in a very weak condition, and in a few weeks failed so much that she gradually died of exhaustion.

Dr. Wharton added that gangrene of the rectum, aside from that condition resulting from unreduced prolapsus of the rectum, is a rare condition. The vitality possessed by the rectum, as well as other portions of the intestinal tract, permitting it to be subjected to severe traumatisms, without the production of gangrene, and also protecting it against infection. The conditions often observed in strangulated hernia, and in foul abscesses, in close relation to the intestines, where the surrounding tissues are infected and become gangrenous while the intestine remains unaffected, as is often seen in appendical abscesses, are evidences of the immunity which its vitality furnishes. Cripps, Ball and Kelsey, and other writers upon diseases of the rectum, mention gangrenous affections of the rectum, but do not record any such well-defined cases of gangrene of the rectum as the one I have herewith reported. He had only been able to find three other cases similar to the one he had recorded. Dr. J. E. Hulbert (*New Orleans Medical and Surgical Journal*, Vol. vi, p. 72) reports the case of a man of intemperate habits, fifty-two years of age, who applied to him for treatment. The patient had six months before suffered from pneumonia. At the time he came under observation the belly was hard and distended, and he suffered from a mucopurulent discharge from the rectum, with the presence of scybalous masses. This patient, fifteen days later, while at stool, passed a slough from the anus, which, on examination, was found to be the entire rectum, and he died five hours later. Autopsy

revealed the fact that the gangrenous mass passed consisted of the rectum from the sigmoid flexure to the anus.

DR. J. P. JUDKINS (*Ohio Medical and Surgical Journal*, September, 1848) reports a case of inflammation and sloughing of the rectum in a man aged forty-five. The first symptoms were those of irritation at the neck of the bladder, but the patient later passed a small amount of blood from the rectum, mixed with sanious fluid, and on the thirty-second day of his illness a slough, three inches in length, protruded from the anus, being adherent at the internal sphincter. The patient died a month later from exhaustion. A post-mortem examination showed entire destruction of the rectum, from the lower border of the promontory of the sacrum to the anus.

LARREY (*Journal de Chirurgie*, Desault, Paris, 1792, Vol. iv, p. 97) reports the case of a soldier, who applied for treatment for what appeared to be an ordinary urethritis, which responded to treatment. After a few weeks he was suddenly seized with severe colicky pains in the abdomen, followed by vomiting; the pulse became small and intermittent, the patient falling into a state of collapse, and died in thirty hours after the appearance of these symptoms. A post-mortem examination in this case revealed the fact that the rectum was gangrenous from the sigmoid flexure to the anus.

Cases of gangrene of limited portions of the rectum have been recorded by many writers. G. Baumgartel (*Zeitschrift für Wund Aerzte und Geburtshülfer*, 1877, No. 28, p. 104) reports the case of a male, aged forty-four years, who was seized with vomiting and constipation, which did not yield to ordinary measures; there was pain in the left sacral region anteriorly, and the presence of a soft tumor could be demonstrated. On the twentieth day collapse developed, and the patient passed a piece of tubular slough of mucous membrane, three inches in length and two inches in diameter. After the removal of the dead tissue the patient improved, and in six months had recovered, but suffered from stricture of the lower portion of the rectum, which was treated by dilatation.

W. M. A. WRIGHT (*Transactions of the Academy of Medicine*, Dublin, 1885) reports the case of a partial sloughing of the rectum in a woman, aged sixty-five years, which came on suddenly. The patient had suffered from hæmorrhoids for a long time. The

sloughing of the rectum was preceded by an attack of acute inflammation of the piles. There was a marked erysipelatous inflammation of the surrounding tissues, and the formation of a fistula, and later an abscess. The portion of the rectal wall which sloughed was about the size of a half-crown. The sloughing in this case was attributed to the pressure of a mass of impacted fæces. The patient made a good recovery without the formation of a stricture.

N. DAVIS COLLEY (*Transactions of the Pathological Society*, London, Vol. xxxvii, 1886) reports a case of partial gangrene of the rectum, in a man thirty-seven years of age, in which a tubular slough of the mucous membrane of the rectum, three inches in length and two inches in diameter, had been passed by the anus. This sloughing occurred from the use of an enema consisting of an ammonia mixture and liquor ammonia. This patient recovered with a stricture, which gradually improved under dilatation, so that he passed natural movements.

As far as the reports of the cases show, complete gangrene of the rectum has always been fatal. If, however, a patient suffering from gangrene of the rectum should recover, the stricture resulting would probably cause, sooner or later, symptoms of intestinal obstruction, so that a colostomy would be required. After this, if too large a portion of the rectal wall has not been destroyed, and the sphincter remained intact, it might be possible to dissect the rectum loose, and bring it down and attach it to the skin.

In cases of gangrene of a limited portion of the rectum, recovery usually takes place, the patients in most cases suffering from stricture of the rectum, which seems to have been amenable to the treatment by dilatation.

DR. WHARTON also related the following two cases of gangrenous periproctitis: Miss C., aged forty-five years, was said to suffer from hæmorrhoids, and was under the care of an irregular rectal specialist, who, under nitrous oxide gas, dilated the sphincter, and probably made some application to the hæmorrhoids. She returned to her home in the country, a few miles from Philadelphia, and suffered so much pain in the region of the anus that upon the following day she sent for her family physician. Dr. Wharton was called to see her with her physician on the third day after the operation of dilatation of the sphincter, and found

her suffering from great pain in the region of the rectum and the lower part of the abdomen; the belly was distended and tender on pressure, temperature 103° F., and pulse 120.

Upon examining the anal region the tissues were swollen and of a dull red color. The swelling and induration extended well out upon the buttocks. No localized spot of suppuration could be found, but upon pressure over the indurated tissues crepitation could be elicited.

The patient was etherized, and long, curved incisions were made through the indurated tissues on each side of the anus, outside of the line of the sphincter muscle, opening freely the ischio-rectal fossæ. Upon exposing the connective tissue it was found to be of a dull gray color, and there was discharged a little thin, grayish fluid. The finger passed into the incision could be carried around the rectal tube and brought up as high as the promontory of the sacrum. The connective tissue, which was found to be gangrenous throughout, was broken down with the finger, and the wounds were then freely irrigated with a 1 : 2000 bichloride solution; two large rubber drainage-tubes were then carried to the depth of the wound, and also a few strips of iodoform gauze were loosely packed into the wound, to secure additional drainage, and a gauze dressing was next applied. On the following day the temperature was normal and the patient was entirely relieved of pain. For some days, however, large sloughs escaped from the incisions, and, after the sloughs had escaped, the wounds were covered with healthy granulations, and the patient made a good recovery.

Mr. B., aged fifty-four years. This patient was also under the care of an irregular rectal specialist for hæmorrhoids, and was operated upon December, 1897. The treatment in this case, as far as could be ascertained, was probably an injection into the hæmorrhoids. On the day following the injection the patient suffered considerable pain in the region of the anus, which kept him from going to his business. He remained at home for a few days and suffered severe pain, and also developed a considerable amount of fever. Five days after the treatment he sent for his regular medical attendant, who feared the formation of an ischio-rectal abscess, and applied hot dressings, and on the following day made an incision into the indurated swollen tissues in the region of the anus, but no pus escaped.

On the next day, the seventh day after the original treatment, his condition was so unfavorable that Dr. Wharton was asked to see him with his physicians. His temperature at this time was 106° F., his pulse 140. The patient suffered intense pain in the region of the anus. The tissues in the region of the anus were swollen and indurated, the induration extending well out to the gluteal regions, and was so marked in the perineum as to cause the retention of the urine, and great difficulty in the introduction of the catheter.

The patient was etherized, and long curved incisions were made through the indurated tissue in the region of the anus, and these incisions exposed dark-colored, gangrenous, cellular tissue. The finger could be introduced through these incisions and passed completely around the rectal tube. The wounds were thoroughly irrigated with bichloride solution, and rubber tubes and gauze drains were introduced. The patient improved rapidly after the incisions were made, the temperature soon becoming normal. Large sloughs of cellular tissue were discharged from the wound for some time, but after several weeks the wounds were covered with healthy granulations, and the patient ultimately made a good recovery.

Gangrenous periproctitis is a much more common affection than complete gangrene of the rectum, but he had thought it worth while to report these two cases of this affection, from the fact that in both the disease developed shortly after some local treatment by irregular practitioners; that the patients were extremely ill at the time of the operation, and from the fact that the treatment by free incision apparently arrested the gangrenous process, and possibly saved the rectum itself from gangrene, and was followed in each case by satisfactory recovery.

He regretted that in these cases he did not have with him the means to have a culture made, so that the definite infection in each case could be ascertained. In the first case the rapidity of the gangrenous process, and the presence of air in the cellular tissue, as evidenced by crepitation, which could be well demonstrated, pointed to the possible infection of the tissues by the bacillus of malignant œdema, or more likely by the bacillus aërogenes capsulatus.

DR. OSCAR H. ALLIS said that sometimes only a partial gangrene takes place and the lateral portion is involved. He re-

membered a case, which was supposed to have had typhoid fever, in which a considerable portion of the lower end of the bowel was involved. The patient recovered with a one-sided scar about the lower third of the rectum, involving a lateral half of the sphincters. No trouble is experienced when the bowels are in good condition, but a diaper is necessary in case of diarrhœa.

He related the case of a girl, twenty years of age, who had suffered a great deal from inability to move the bowels, when examination revealed an intussusception within reach of the finger when inserted into the rectum. A soft catheter was passed through the constriction and relief obtained from the accumulation of gas.

He would like to know how low down intussusception could take place; for example, could it occur as low as the upper third of the rectum?

DR. JOHN ASHHURST, Jr., said he had never seen a case of gangrene of the rectum itself, but he had seen gangrenous inflammation of the tissues around the rectum, especially in connection with diabetes. He had also observed a similar condition in cases of neglected ischio-rectal abscess, and it may be a complication in advanced cases of granular degeneration of the kidney.

In reply to Dr. Allis's question, it may be said that even in ileo-cæcal intussusception the bowel may protrude from the anus, and that in the complete form of rectal prolapsus, met with in children, there is actually an invagination of the rectal walls.

DR. R. H. HARTE said that he had seen one typical case of gangrene of the rectum in consultation with a colleague at the Pennsylvania Hospital. Some error was made in giving an enema during which the man complained of intense pain. Six hours after the enema had been given the parts were enormously swollen far up into the bowel. The patient died in the course of a few weeks of peritonitis and was very much exhausted. He believed it was a case of gangrene of the rectum, although, maybe, not complete.

DR. DEFOREST WILLARD said that after the injection of hæmorrhoids with carbolic acid many cases are followed by results similar to those related by Dr. Wharton. He was recently called out in the night to an old gentleman who had thus suffered at the hands of one of these quacks and found him moribund and

delirious. Almost the entire ischio-rectal fossa was in a gangrenous condition, and exuding from the anus was a very offensive fluid. He made a number of incisions, but the patient died before morning. He did not think surgeons could speak too positively about this matter when so many wonderful cures are falsely reported as following these injections.

He remembered a fatal case similar to Dr. Harte's, in which a woman had been given an injection into the rectum, and the point of a syringe had perforated the tube. The injection consisted of turpentine, and had been thrown into the abdominal cavity.

DR. WHARTON said, in rejoinder, that in both of his cases he made a rectal examination and satisfied himself that there was no intussusception.

He reported the cases of gangrenous periproctitis, because they had both been operated upon by unqualified practitioners, and in one the injection was of carbolic acid, while in the other stretching of the sphincter was resorted to. In treating hæmorrhoids by injection one great danger is sloughing of the rectum and tissues of the anus, which will give rise to a very troublesome stricture. A few years ago he saw a man who had received a carbolic injection for hæmorrhoids, and the whole tissues in the region of the anus seemed to have sloughed. Cicatrization occurred and so tight a stricture resulted that only the tip of the little finger could be admitted. He dissected out the cicatricial tissue, and found that the sphincter had not been destroyed, so he brought the mucous membrane down and stitched it to the skin, with a good result.

SEPARATION OF THE UPPER EPIPHYSIS OF THE HUMERUS.[1]

By HENRY R. WHARTON, M.D.

This accident may occur at any period of life from birth up to the twentieth year, and consists in a separation of the upper epiphysis of the humerus, comprising the head and tuberosities, from the diaphysis, and does not open the shoulder-joint; the line of separation being the line of the epiphysis, which begins at the axillary margin of the head of the bone and runs across it, slightly rising towards the centre in a direction almost horizontal, and ends at the outer side just below the position of the tuberosities, the line of separation in this injury closely approximating that observed in fracture of the anatomical neck of the humerus.

R. W. Smith ("Fractures and Dislocations," 1847), in describing this injury, says that the head of the bone can be felt in the glenoid cavity, and remains motionless when the shaft of the bone is rotated. The deformity is usually marked, and consists of a distinct prominence below the coracoid process, caused by the upper extremity of the lower fragment projecting in front of the shoulder-joint, and also the fragment being drawn inward and forward by the muscles passing from the chest to the humerus. Shortening is usually not marked, from the fact that the two surfaces are extensive, and are not entirely separated from each other.

It has been pointed out by Moore that the separated surfaces may preserve their normal relations to each other, and little deformity occur. This, in my experience, is unusual, and I think is most likely to be the case in very young subjects.

Moore has observed that the displacement is not usually complete, but that the upper end of the lower fragment is carried inward to a distance of about one-quarter of its diameter, when it is arrested by the convexity of the lower fragment becoming lodged in the natural concavity in the upper fragment, caused by the epiphyseal line; the upper fragment now becomes tilted by the action of the muscles, its internal margin ascending into the glenoid cavity, and its outer margin descending until it is arrested by the capsule.

This accident is most likely to be confounded with dislocation of the shoulder, but a mistake is not likely to occur if one observes that the shoulder-joint is not rigid, and that the arm hangs close to the side, and that the elbow is directed slightly backward and outward, and that there is a marked prominence of an inch and a half below and anterior to the acromion process. It should also be remembered that dislocation of the shoulder in children is an extremely rare accident. By manipulation crepitus can also often be obtained.

The reduction of the deformity, although it is considered by Moore not to be difficult, is, I think, usually a matter of the greatest difficulty. I have attempted it under ether without marked success, and where I have been able to bring about its reduction, it has often reappeared after the reducing force was withdrawn. R. W. Smith states that there is no fracture of the upper extremity in which it is more difficult to retain the fragments in their relative positions. Moore, in bringing about reduction, recommends that the arm be carried forward and upward in a perpendicular line; the upper fragment, or epiphysis, will remain fixed, being held fast by the capsule inserted into the outer and posterior margins of the head of the bone, while the lower fragment, or diaphysis, aided by the natural action of the muscles, will move outward and resume its original position. I am free to confess that, although I have seen the deformity diminish under this manipulation, I have not been able to completely reduce it to my satisfaction in cases where the deformity was marked before the manipulations were attempted.

In spite of the fact that it is often impossible to bring about complete reduction of the deformity, the results of treatment are usually most satisfactory as regards the functional result. The treatment which is generally recommended, and which I have adopted in cases coming under my own observation, consists in attempting by manipulation to restore the fragments as nearly as possible to their normal position. The dressing, then, consists in applying a primary roller to the forearm and arm, from the tips of the fingers to the axilla. A wedge-shaped pad of oakum or lint is next placed between the arm and the chest, with its base in the

FIG. 1.—Deformity in separation of the upper epiphysis of the right humerus.

axilla. A shoulder-cap of binders' board is next moulded to the shoulder and outer surface of the arm, extending to a point a short distance above the condyles; this is padded and applied to the arm and shoulder, and secured by a bandage. The arm is next brought firmly against the side of the chest, and secured by circular turns of a bandage. The forearm is then supported in a sling, in which the forearm rests at the wrist. The dressing is practically that known as Ferguson's for fractures of the upper extremity of the humerus. The dressing is changed at intervals of two or three days, and all

dressing is usually dispensed with at the end of the third or fourth week, passive motion not being made until this time.

The functional result following this injury, as before stated, is usually very good, but it sometimes happens that non-union occurs, causing an unfavorable result, as in a case reported by Hamilton, and also that occasionally osteomye-

FIG. 2.—Separation of the upper epiphysis of the humerus.

litis may follow the injury, as in a case recorded by Esmarch, in which excision of the joint was resorted to.

Arrest of growth of the limb in length has also been pointed out as a possible result of epiphyseal separation from injury, and premature ossification of the cartilage of conjunction. Although this is a possible sequel of the injury, I do not think that it is a very common one, for the cases which

I have had under observation for several years show no difference in the length of the limbs on each side. I desire to place on record the following four cases of this injury:

CASE I.—C. McC., aged sixteen years, in the month of March, 1896, fell from the roof of a porch, about fourteen feet in height, striking upon the right shoulder. Upon examination, I found he had sustained a separation of the upper epiphysis of the right humerus. A photograph, taken shortly after the accident (Fig. 1), shows the characteristic deformity of this in-

FIG. 3.—Skiagraph of case shown in Fig. 2, one year after the injury.

jury, and a skiagraph taken at the same time (Fig. 2) shows the position of the fragments. The patient recovered with a good functional result, and a skiagraph taken a year after the accident (Fig. 3) shows that the space between the fragments has been filled up by callus. Motion at the shoulder-joint at this time being almost perfect.

CASE II.—J. B., a boy, aged ten years, during July, 1897, fell from a fence six feet in height, and struck upon his left shoulder, sustaining a separation of the upper epiphysis of the humerus. A skiagraph (Fig. 4), taken immediately after the accident, shows the typical deformity. This patient recovered with little deformity, and complete motion at the shoulder-joint.

CASE III.—E. C., aged nine years, received, in September, 1897, a fall, striking upon the right shoulder, and, on examination, I found she had sustained a separation of the upper epiphysis of the humerus. This patient recovered with a very useful arm.

FIG. 4.—Skiagraph of separation of the upper epiphysis of the humerus.

CASE IV.—E. M., aged thirteen years, while playing football received a fall, striking upon the right shoulder. Examination showed the characteristic deformity of separation of the upper epiphysis of the humerus; a skiagraph, taken a short time afterwards, confirmed the diagnosis. This patient also recovered with almost complete function of the shoulder-joint.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, June 6, 1898.

The President, J. Ewing Mears, M.D., in the Chair.

CHOLECYSTOLITHOTOMY.

Dr. Robert G. Le Conte reported the following case: A man, fifty-eight years of age, enjoyed fair health until June, 1896, when he suffered a severe attack of hepatic colic, followed by others at short intervals. During the fourth attack he was admitted to the Methodist Episcopal Hospital, under the care of Dr. Tunis. The tumor rapidly subsided and the symptoms abated. He was placed on a tonic treatment with large doses of olive oil, and the stools carefully watched for calculi, but none were passed. The bowel movements did contain frequently a quantity of sandy material, which, on examination, proved to be mostly cholesterin. He remained in the hospital eight weeks, gained fifteen pounds, and felt perfectly well. He continued well for several months, when his attacks recurred in a milder form, with considerable intestinal indigestion and fermentation. In only one of these attacks (September, 1897) was the gall-bladder again enlarged. The attacks subsided with a considerable quantity of this sandy material in the stools. He was readmitted to the Methodist Episcopal Hospital April 12, 1898, under Dr. Le Conte's care, just after one of these attacks. He was very thin, weak, and slightly jaundiced. Examination of the abdomen revealed an enlarged liver, extending an inch or more below the border of the ribs, a little harder than normal, with a rounded edge. The gall-bladder could not be detected. The other organs were apparently normal, except that the lungs were slightly hyperresonant. He was placed on a light, nutritious diet, principally milk, eggs, and rare meats, the bowels kept open with phosphate of soda and Hunyadi water, and nitro-muriatic acid administered.

At the end of two weeks he had gained five or six pounds, and felt quite strong again. He was told that his attacks probably depended upon gall-stones impacted in the gall-bladder, although their demonstration was impossible. He consented to operation. Etherized April 27; abdomen opened over region of gall-bladder for a distance of three inches and a half. The transverse colon was adherent to and covered the whole gall-bladder. On separating the adhesions a contracted, small, dense gall-bladder was exposed, adherent through its whole length to the liver, with the fundus about an inch from the anterior edge of the liver. Calculi could be easily felt through its walls. It was immovable and impossible to bring to the surface of the wound. The surrounding bowel was packed off with gauze, a silk stitch passed through the fundus for better control of the organ and its under surface incised for an inch. The walls were nearly a quarter of an inch thick. Six stones were removed, the last being well down in the cystic duct. In addition to the stones, it contained a drachm or two of turbid, mucous-like fluid. The common and hepatic ducts were free from concretions. The gall-bladder wound was then closed with a continuous silk suture, penetrating to the mucous coat, but the attempt to cover this with a running Lembert suture failed, owing to the unyielding rigidity of the walls. A strip of gauze was then packed around the gall-bladder, and the abdomen closed with through-and-through silkworm-gut sutures. No reaction followed the operation. The gauze pack was removed in forty-eight hours, and a small rubber tube inserted for a day. The wound was entirely healed in ten days, and the recovery uneventful.

UNSUCCESSFUL NEPHROLITHOTOMY, WITH SUBSEQUENT PASSAGE OF THE STONE BY URETHRA.

Dr. Le Conte also reported the following case: E. E. S., aged twenty-six years, printer, was admitted to the medical wards of the Methodist Episcopal Hospital February 11, 1897, with symptoms of gastro-enteritis, fever, headache, coated tongue, anorexia, vomiting, constipation, and abdominal pain and tenderness, more marked on right side. These symptoms began suddenly, and were of four days' duration, and gradually subsided three or four days after admission.

Previous History.—Perfectly well until three and a half years ago, when he was suddenly seized with throbbing pain in right lumbar region, lasting two days. Since then similar attacks have recurred every two to four weeks, and latterly the pain has extended to the bladder. The right kidney was high up and difficult to palpate, but no stone could be felt. The patient was advised that renal calculus was the probable cause of his trouble, but he refused to remain for operation. Readmitted to the hospital March 8, 1897, surgical wards, with a history of another similar attack since last admission. Urine twice examined. Phosphates and uric acid abundant, but no blood or pus present. Three radiographs were taken by Dr. Goodspeed, all of which proved negative. To recapitulate: The attacks were always sudden in onset, without apparent cause, with vomiting, pain, and tenderness most marked in the region of the right kidney, and referred to the bladder. Palpation only showed a high position of the kidney; urine without blood or pus, and the radiograph negative; diagnosis, renal calculus. Two days after admission the patient was etherized and a lateral lumbar incision made over the right kidney. Only the lower part of the organ was exposed, and after much difficulty, owing to fibrous bands, the whole kidney was brought down into the wound. Careful palpation of the organ did not show anything, and a needle passed in various directions met with no resistance. The kidney was not opened, and the diagnosis revised to perinephritic inflammation with adhesions. The kidney was returned free of adhesions, a strip of gauze and a small rubber drain inserted, and the wound closed. The recovery was uneventful, but delayed, owing to the drainage track persisting as a small sinus. Discharged April 7; wound entirely healed. About two weeks after his discharge he had another attack of renal colic, lasting about a day, and two days later he voided with the urine a small stone, seven-sixteenths of an inch long by one-fourth of an inch broad. The stone, at the time of operation, was probably caught in one of the calyces, and the manipulations which were practised on the kidney dislodged it, allowing it later to engage in the ureter and be passed. The kidney was not opened at the time of operation, because the operator believed he had been mistaken in his diagnosis, and that the adhesions found were probably sufficient to account for his symptoms.

DR. W. J. TAYLOR remarked that in all cases of kidney operations, whether the surgeon is able to feel the stone in the kidney by means of the needle or not, the kidney should be opened. In many cases the stone is not found by the needle when unquestionably there is a stone in the organ itself, and it does not materially increase the gravity of the operation, if at all, to incise the kidney. If no stone is found, a slight amount of drain can be kept up, which will relieve the congestion of the kidney, and he thought that the future value of a kidney is not materially decreased by such an operation.

DR. BARTON agreed with Dr. Taylor, as he had known of some cases where the stone undoubtedly would not have been found if the kidney had not been opened. He thought it also well to examine the pelvis of the kidney and the ureter. In one case, in which he not only exposed the kidney but incised it and failed to find the stone, the symptoms persisted, and some months after he decided to excise the kidney. After delivering the kidney, and before cutting and ligating the vessels, on running his finger down the ureter, he detected a large stone in a dilated ureter. He incised the ureter and delivered the stone, closing the ureter with a continuous Lembert suture, and, after ligating the bleeding points of the torn kidney, put it back again. The man made a perfect recovery.

DR. LE CONTE said, in rejoinder, that he agreed thoroughly with the remarks that had been made, but in this case the kidney was very difficult to get out. It was densely adherent, and he thought the local condition would probably account for all the symptoms. He did not care to open the kidney, as he could not reach the artery to compress it, and he was a little fearful of hæmorrhage. However, in a stone of this small size, he doubted very much if he would have been able to find it unless he had cut the kidney to a very great extent.

EXCISION OF THE HIP-JOINT.

DR. HARRY C. DEAVER presented a young man, who was admitted to the Episcopal Hospital July 25, 1896, with a history of having injured his hip by falling from a building twenty months previously. Sixteen months later an abscess developed, and was opened, and when admitted was draining through a sinus on the anterior surface of the thigh. He complained of

severe pain, especially on motion. There was no ankylosis, but dead bone could be felt at the bottom of the sinus, which led directly into the joint. Three days after his admittance an excision was made of the head by "Barker's" incision; a counter-opening was made and a drainage-tube was inserted. The case did well. At the end of three weeks gentle passive motion was made. The fourth week he was up on crutches, and was discharged seven weeks after operation. It is almost two years since operation, the wound is entirely healed, and he has good motion in the hip-joint.

DR. WHARTON said that he had had a few cases of anterior excision of the hip, and he thought it to be a very good operation in early cases, where an abscess has formed. You can then remove the dead bone and leave practically all the muscular attachments to the greater and lesser trochanters of the femur. The operation is not an easy one, particularly in adults. Even after dividing the neck of the bone close to the shaft, it is often very difficult to deliver the head of the bone. He had operated on a few young children in the early stages of hip-disease, and here it is a very favorable operation.

With reference to the amount of shortening, it is less than in the ordinary excision, where the head and neck and greater trochanter are removed.

SEPARATION OF THE LOWER EPIPHYSIS OF THE FEMUR.

DR. HARRY C. DEAVER presented a boy who was admitted to St. Mary's Hospital November 11, 1897, having had his left leg caught between the spokes of a revolving wheel of a wagon, and having sustained in consequence a fracture of the thigh through the lower epiphysis. Dr. Deaver saw him the following day, and found the limb greatly swollen at the seat of injury. The lower end of upper fragment could be felt in popliteal space. He opened up the popliteal space in the median line, and found liquid blood and clots and an oblique fracture, the line of fracture extending from without inward, beginning one inch above the epiphyseal line, going through the epiphysis, and extending down into the internal condyle of the femur, and communicating with the knee-joint. He delivered the lower end of the upper fragment, sawing about a half inch off of it, and reduced the

fracture. The wound was closed, with drainage, and the limb dressed in a flexed position at an angle of 135 degrees. Twelve days later the wound was dressed, and the limb straightened out, and put in plaster. Twenty-two days after this the plaster was removed, and passive motion and massage completed the cure. He has now very good use of the limb, with perfect flexion and extension.

DR. WHARTON remarked that this case could hardly be classed as a typical compound separation of the lower epiphysis of the femur. The manner in which it was produced seems to be one in which many such accidents occur. He had seen three compound separations of the lower epiphysis of the femur produced in the same manner; in all of these cases, by reason of the extensive injury to the soft parts and blood-vessels, amputation was required.

DR. HARTE thought that this case, which was not a true epiphyseal separation, but a fracture running obliquely downward to the epiphysis, would go to refute the popular idea that all injuries of the lower parts of the femur in children are epiphyseal separations. It has been stated by a very excellent authority that in all injuries, in relation to joints, the epiphysis being the weaker point, the bone was invariably separated at that point. This case illustrates the opposite view, and you would naturally suppose that in an injury of this sort the femur would give way at the epiphyseal juncture, as it was presumably the weaker point, but in this case the reverse had happened.

POSTCÆCAL ABSCESS OF APPENDICULAR ORIGIN.

DR. HARRY C. DEAVER said that on the 16th of May, 1897, he was called by Dr. Keith, of Schaefferstown, Lebanon County, Pa., to see a young man, aged twenty-two years, who was suffering with a very severe attack of appendicitis. One week previously, while in a five-mile bicycle race, he was taken with a severe pain in his abdomen, which gradually got worse, but being anxious to win the trophy, he rode to the finish. The doctor saw him a few hours afterwards, when he found him suffering with general abdominal pain, vomiting, and extreme tenderness all over the abdomen. The pain was relieved only by large doses of opium (tinctura opii deodorata). When Dr. Deaver saw him

he was in a semi-narcotized state, pupils contracted, pulse 130, weak, and compressible; temperature 99° F., an anxious expression, rigidity of abdominal wall on both sides, but more tenderness on the right side. He had had practically no nourishment since his attack. Dr. Deaver declined to operate, on account of the general peritonitis, his extreme weakness, and seminarcosis, but recommended to withdraw the opium, to encourage bowel movements by enema and calomel by the mouth, agreeing to operate later if he improved. His condition did gradually improve, and two weeks later Dr. Deaver saw him the second time, and found his condition to be very much better; pulse 90, fair volume; temperature 99½°. The general abdominal tenderness and rigidity had subsided, but there was a tender spot over the region of the appendix, with slight fulness, but no fluctuation. He made an incision over this area, and opened up a small abscess cavity, which contained about an ounce and a half of pus, which was not very offensive. He examined the cavity very carefully, feeling that there must be a larger collection of pus elsewhere, as an abscess cavity of this character did not account for the severe character of his illness, but could not find any communication, so he simply packed with iodoform gauze. The patient was under ether twenty minutes; he was considerably shocked. Stimulants were given freely, strychnine hypodermically. One hour after this he began to hiccough, which rapidly grew worse, and continued for twenty-four hours without relief, when he was seized with a violent fit of coughing, which was followed by free expectoration of dirty, foul pus, fæcal in odor. His general condition was very bad, the flow of foul pus through bronchi continued for a week, then gradually subsided, and the patient began to improve, and rapidly convalesced, and was out of bed in one month's time from the operation. In the opinion of the reporter the abscess cavity that was opened was secondary to the collection behind the cæcum and colon, and the appendix was postcolic. When the appendix holds this position it is usually adherent to the colon without any mesoappendix, unless it is at its distal end, where it is sometimes found free with a short mesentery. He had seen this condition in cases in which he had operated for chronic appendicitis. When the end of a postcolic appendix lies high up the extreme point of tenderness may be in the region of the right kidney, and the symptoms may

simulate a perirenal suppuration, or if the base of the appendix be the seat of perforation, the point of greatest tenderness may be in the loin, just above the post-superspinous process. In the case reported this postcolic abscess burrowed and extended along the under surface of the diaphragm, ulcerating through into the right lung, and rupturing into a bronchus. The retching caused by the anæsthetic excited violent contraction of the diaphragm, and subsequent rupture of the abscess cavity. At no time during this young man's illness did he present any symptoms of such a condition.

A second case of postcæcal abscess was as follows: A young man, aged twenty-six years, had been ill two weeks with acute appendicitis; the onset was sudden and severe. He had general peritonitis. Treatment had been "opium and salts." When first seen by Dr. Deaver his temperature was 99° F., pulse 80, with localized soreness over appendical region, some rigidity of right rectus with a decided swelling. His general condition was good, stomach retentive, bowels moving daily, and he was taking sufficient liquid nourishment. He was brought to Philadelphia the following morning, and operated upon at 4 P.M. A large abscess was opened, thoroughly cleaned, and carefully examined, but found completely shut off. He did well for thirty-six hours, when peritonitis set in, which was thought to be the result of leakage from a deeper seated abscess. The abdomen was reopened, and a large abscess cavity was found behind the cæcum, which had dissected up the inner layer of the ascending mesocolon, and extended under the mesentery. The peritoneal cavity was thoroughly washed out and drained. Patient did not react.

In dealing with appendical abscess, Dr. Deaver had found that they vary according to the position of the appendix. When the appendix comes off the lower end of the cæcum, and lies to the outer side, in relation with the iliac fossa, an abscess in this region is easily dealt with. The pus cavity is either opened up as soon as the peritoneum is incised, or the omentum covers the abscess, congested with a small area of inflammatory induration, which locates the abscess with a gangrenous or perforated appendix. When the appendix comes off the base of the cæcum and extends into the pelvis, the location of the abscess depends on the seat of perforation. If it is at the base of the appendix, it will be found underneath the cæcum, and frequently he had

found a secondary abscess in the pelvis communicating with it. When that portion of the appendix occupying the pelvis is gangrenous at perforation, we find the abscess in this region, and if it is of long duration, it may extend as far as the rectum or bladder, and rupture into one of these viscera. A postcæcal appendical abscess may burrow behind the ascending colon, rupturing as it did in the first case reported, may extend under the inner layer of the ascending mesocolon and under the mesentery, as it did in the second case. These two cases demonstrate the importance of early operation in acute appendicitis.

THE TREATMENT OF FRACTURES OF THE NOSE.

By GWILYM G. DAVIS, M.D., M.R.C.S. (Eng.),

SURGEON TO THE EPISCOPAL, ST. JOSEPH'S, AND ORTHOPÆDIC HOSPITALS.

The subject of fractures of the nose is hardly treated in our text-books with such clearness of description as to the character of this injury and its treatment as to enable those not quite familiar with it to decide what course to pursue in the individual case.

Nasal surgery has made such advances of recent years that to do good general surgery one should possess also some of the resources of the specialist. The extent of an injury to the nose is to be discovered by both an external and internal examination. Externally it is to be noted whether the normal outline is preserved. There is frequently a deviation to one side or an obvious depression. The surface should be carefully felt with the finger-tip, as by so doing inequalities which are hidden by swelling may be detected. Lateral movement will usually elicit crepitus. Internally, examination may be obstructed by swelling and clotted blood. The latter is to be carefully washed away by gentle syringing or wiped away with cotton on a cotton-carrier; if bleeding continues, perhaps the use of ice-water or alum or cocaine solution will check it; it is seldom necessary to use packing. Iron salts make too nasty a clot to be recommended, besides being irritating. The use of a head-mirror and speculum is necessary; the largest size oval-shaped ear-speculum is best. Before attempting any extensive manipulation on the inside of the nose, it is desirable to deaden its sensibility; this may be accomplished by wetting a pledget of absorbent

cotton with a 2- or 4-per-cent. solution of cocaine and introducing it. Cocaine-poisoning can occur. I once had a patient, a strong laborer, who, as soon as the pledget was introduced, became deathly pale and faint, and was only restored after being given a liberal amount of ammonia and whiskey, and allowed to lie down for a quarter of an hour. A 4-per-cent. solution of cocaine was used in this case. The use of cocaine in this manner also tends to reduce swelling and

Anchoring a laterally displaced nose by means of a strip of gauze and collodion.

stop any hæmorrhage. Its hæmostatic effect is increased by the addition of 5 per cent. of antipyrin. Instead of examining the patient while sitting he may be placed in the "Rose" position, lying flat on his back, with the head hanging over the edge of the table. The external injury, if marked, consists of a displacement of the bones either antero-posteriorly —that is, the nose is crushed in—or laterally. If the injury

has not been so severe, there may be no displacement or only a slight one. The fragments are sometimes loose and sometimes tight. If the latter is the case, a general anæsthetic (ether) may be given, if thought desirable, while replacement is being attempted. When the bridge has been depressed its elevation may be attempted by introducing a flat steel director (Sir Astley Cooper's), or best by using the flat bill forceps of Adams. To retain it in position, L. D. Mason (*Annals of Anatomy and Surgery*, Vol. ii, p. 107; Vol. iii, p. 81) thrust a pin from side to side through the nose and placed a strip of plaster over from one of its ends to the other. Perhaps a preferable way is to put a piece of cork on each projecting end of the pin and pushing them together until the bridge is sufficiently elevated. The bony deformity in fractures of the nose does not tend to disappear, so that, if it is desired to remedy it, it should be done at once.

To correct lateral deformity, it is often sufficient to simply press the parts back with the fingers. In obstinate cases I have been successful by taking hold of the nose by means of a wet towel. This prevents the fingers from slipping, and gives one a wonderful control over the organ. By pulling directly outward, the fragments can be unlocked and then readily replaced laterally. Success is recognized by the disappearance of the deformity. To correct lateral displacement shields made of lead or gutta-percha have been used; I have not had much experience with them. Adams devised two lateral pads fastened to a head-band and adjusted by a screw. Gamgee ("Treatise on Wounds and Fractures," p. 348) had an apparatus which pressed on one side of the nose by means of a screw and spring.

Quite recently a similar apparatus has been described by Frederick C. Cobb (*Journal of the American Medical Association*, March 12, 1898, p. 588). The difference between them is that Gamgee prevented lateral movement of the apparatus by means of a spectacle frame, while Cobb does so by having a stiff metal head-band fitted carefully to the circumference of the head. I have successfully accomplished the same ob-

ject by taking a strip of gauze and fixing one end to the side of the nose by means of collodion; the opposite cheek is then drawn forward and the other end of the gauze is to be fastened to it by the same means. Thus the nose can be drawn towards the side desired and lateral displacement remedied. It may be noted that the gauze is fastened on its bony portion and not only to its cartilaginous tip. The dressing should be examined, and, if necessary, renewed every other day, so that a constant tension is maintained. These fractures heal very rapidly, so that the dressing may be dispensed with in from three to seven days.

Plastering the nose with sticking plaster serves no useful object, the use of collodion and cotton is better. Deviation of the cartilaginous or bony septum can be determined by ocular inspection or by the gentle introduction of a not-too-large little finger. Intranasal pressure, best exerted by the finger, is more efficacious in pushing and keeping the septum to one side than it is in raising a depressed bridge. Plugging of the nose is disagreeable under any circumstances, and in some intolerable. The use of pins is preferable. They should preferably have a spear point and a flat head lengthwise with the shaft. This head is to be covered with a piece of soft, thin, rubber tubing. They should be introduced while sensation is dulled with local or general anæsthesia and left in place several days. If plugging is resorted to plain cotton is preferable to absorbent cotton, as it contains a small quantity of oil. Inasmuch as the septum is bent towards one side or the other, and not both, it is neither necessary nor desirable to plug both nares; plug only the one towards which the septum is bent. Sometimes plugging the upper portion of the nares only will suffice, leaving a passage on the floor of the nose free for a current of air. The use of hard-rubber tubes to keep the nostrils open and the septum in place may cause excessive pain, and will not be tolerated if there is any pressure exerted by them. A far more comfortable plan is to introduce a piece of soft-rubber drainage-tube. This is very liable to come out, and if it

does, the patient should be instructed to replace it. It is better, however, to rely on pins to keep the septum straight. Dobell's solution, or one made with Seiler's tablets, should be used frequently to spray and cleanse the interior of the nose.

DISCUSSION.

DR. HARTE remarked that there is no bone that recovers so quickly after an injury as the nasal bones, and if not properly replaced at once evil results are certain. In fractures of the nose this point is often overlooked. He thought that in nine cases out of ten of fractures of the bridge of the nose—except of the extreme tip—there is a fracture of the vertical plate of the ethmoid.

His method in dealing with these cases was to use the Adams forceps, carried well in, to forcibly raise up the arch of the nose, then properly replacing the parts with the fingers. Sometimes it may be necessary to plug the nose. Plugging both sides of the nose is a mistake. By plugging one side lateral deflection is more easily corrected. He had never had very much success with the use of catheters, tubes, etc., in the nose.

The great thing in dealing with fractures of the nose is perfect reduction, and that can only be obtained by proper elevation of the fragments by the use of the Adams forceps.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 3, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

EMPLOYMENT OF THE NEEDLE-HOLDER WHENEVER IN SURGICAL OPERATIONS SUTURING IS REQUIRED.

BY OSCAR H. ALLIS, M.D.,

SURGEON TO THE PRESBYTERIAN HOSPITAL.

ONE of the frequent remarks of the elder Gross was that "*the mechanical constitutes but a small part of surgery.*" He looked upon the causation and destructive effects of disease, its diagnosis and medical treatment, as worthy of the profoundest attention of the surgeon, but he looked upon the details of a surgical operation as something that should not engross one's attention, and concerning which no true surgeon would ever make a boastful display.

Were the eminent surgeon permitted to return to his former field of labor nothing would surprise him more than some of the palatial operating rooms, or to watch the details of an operation as performed in modern surgical practice. And while this would surprise him greatly, another matter would equally attract his attention,—viz., that in surgery there is no longer the former distinction between major and minor operations, but, unlike the surgery of former days, the utmost care and surgical detail are bestowed upon the opening of the simplest abscess, the passing of a catheter, the extrac-

tion of a tooth, or the vaccination of an infant. Formerly major operations found a limit when in amputations the surgeon severed the arm or thigh from the trunk, now the surgeon claims the entire human being as his rightful field of labor, never hesitating to enter where disease must be overthrown or accident repaired.

In marked contrast with the feeling held by the earlier surgeons, in which the details of surgery were assigned to a subordinate place, the surgeon of to-day does not hesitate to go before an association of the foremost surgeons of his age, and tell them the relative advantages of some new needle, or mode of preparing a ligature, or a special antiseptic for the hands. That which at one time would have been regarded as a trifle is now raised to its true importance, for nothing that contributes to success, nothing that will contribute to disaster, can be looked upon as a trifle.

With the advancement of surgery has followed, step by step, the ubiquitous statistician, who can tell you the percentage of deaths from every surgical operation, while a commendable rivalry has sprung up among surgeons with a view to trying how far death can be cheated out of his prey, and when death comes when he triumphs, the surgeon asks why, and assigns three general causes,—one shock, a second ether intoxication, a third sepsis,—three great causes of death, and these the modern surgeon feels that he can control, and when for any cause he does not control them, he places the blame where it belongs, not upon the patient, but upon himself, his assistants, or his nurses. To avoid shock, to limit, as far as possible, the period and amount of ether, the modern surgeon bends every energy to detail. He is ready the instant anæsthesia is reached, and with boldness, but not rashness, penetrates to the very heart of the mystery.

While my subject does not permit me to enter into all the details of an operation, there is one general aspect of it that claims attention,—viz., repair. The bistoury can divide, but it cannot do more. It cannot arrest hæmorrhage or close the wound. Upon the latter the immediate and future wel-

fare of the patient depends. How often hæmorrhage from a deep vessel in the abdominal cavity persists because the operator has not the skill to use an instrument or because he has not at hand the proper instrument. How often prompt and permanent repair is defeated by lack of skill and care in the readjustments of separated tissues. The medical student leaves his alma mater with the certificate that he has taken special instruction in operative surgery, but formerly, and I fear at the present day, the repair of his work, the careful suturing, the management of the needle and suture, the needle-holder had no part in his course: he was taught to cut and saw and bandage, but not the beautiful plastic work of repair,—the part that will be upon exhibition so long as the patient lives.

It is claimed by some eminent surgeons of the present day that Adam had in his possession the best needle-carriers ever invented, and that he has transmitted to posterity an inheritance that cannot be improved upon. Hence many modern surgeons employ the fingers and thumb for all superficial suturing, and only resort to artificial helps when the damage to be repaired lies in some deep cavity; apparently oblivious to the fact that it is under these circumstances that their greatest manual skill is required, and unless by practice they have acquired that skill their operation will be prolonged, much to the disadvantage of their patient or, as not infrequently happens, will be defective and result in failure.

But I take exception to the statement that Adam possessed the best pair of needle-holders. Certainly, if his equipment was complete, there would have been no room for a thimble. To the tailor and seamstress, who make a living by the needle, as well as the lady whose artistic piece of embroidery rivals the pencil of the artist, the thimble is an absolute necessity.

With the surgeon the toughness of the fabric that he must mend—viz., the human skin—demands some special advantage. He must have a thimble or a pair of forceps, or the needle itself must have cutting edges, piercing and cutting

as it is forced through the tissues; and those who boast that they do not require a needle-holder must confess that they have favorite needles. Cutting needles always leave permanent traces of their havoc, and should never be used in surgery of the face.

The difficulty of suturing in deep cavities has puzzled surgeons for many generations. Certainly the management of a needle in the jaws of a needle-holder in clefts of the palate or in suturing the tough uterine tissues presents many obstacles, and many skilful surgeons have abandoned needle-holders in these operations and employ special long-handled needles with eye at the point to be threaded after the tissues have been pierced.

Of needle-holders there are scores that possess great excellence, and between which no just discrimination can be made. I am not writing to suggest a new instrument, I am rather making a plea for the mastery of instruments already in our hands, and for that mastery the means lie at our doors. Not in actual surgical practice, for few surgeons will average a score of sutures a week, but rather in a harmless, painless drill in just such handiwork as has engaged our mothers, wives, sisters, and daughters in what would otherwise have been misspent time. I would seriously recommend, to the young surgeon especially, that he take a few lessons in embroidery. He will find the outlining stitch so easy that he can acquire it in a few moments; but while it can be learned in five minutes he will find that to work his monogram or the initials of his name neatly on an office towel, to do it quickly and with ease, he must devote many a spare moment; but these spare moments had better be spent upon a towel than that he fall short of skill when it shall be needed in a surgical operation.

Should the surgeon not think this suggestion beneath his surgical dignity let me make a still further suggestion. If one watch a fair needle expert upon her embroidery, he will find that she shifts it with every change in the figure,—sometimes having her work upsidedown, at others by the

side. The surgeon must educate himself to overcome this obstacle. To him the light enters often from one window, and he finds that he can neither shift the light nor his patient. Then it is that he wishes that he could take his needle-holder in his left hand. As a practice, then, I have myself embroidered without changing the position of my work,—working with either hand from right to left, from left to right, towards me and from me, as most convenient, and while at first I found it toilsome and awkward, I felt that it was only necessary to persevere, when the mastery, or if not the mastery, a commendable degree of excellence would be acquired.

I have thus far said nothing of the management of the thread. One may watch an accomplished needle-worker for hours and never note a tangle or a catch of the thread. But, alas, this cannot often be said of the surgeon, who, though he may have but a few sutures to use, these few by a perversion and obstinacy almost demoniacal, will kink, twist, get caught around hæmostats, or pull out at the wrong time, and thus give rise to delay that may add seriously to the final result.

My plea, then, is for the mastery of the needle-holder, for its universal employment, and I especially urge upon the younger surgeons the employment of spare moments in attaining ambidexterity with this instrument.

DISCUSSION.

DR. J. C. DA COSTA presented a needle-holder the motion of whose blades was parallel, and the grip of which was very firm, being secured by a "knee-joint" lever mechanism.

DR. DEAVER said that he worked with his fingers and hand more than with a needle-holder, and only used it when forced to do so. Personally he had found nothing more satisfactory as a needle-holder than the hæmostatic forceps. In the mouth and in operations on the cleft palate they are useful. In intestinal work, where one is able to bring the parts to be sutured to the surface of the wound, the finger answers every purpose.

DR. HARTE said that in the Pennsylvania Hospital there was

almost a museum of needle-holders which represented a great deal of money and ingenuity. Personally he used a needle-holder only in cavities. He could do three times as much with the finger and thumb as with a needle-holder, except in cavities such as the pelvis, vagina, or in the mouth.

DR. ROBERTS asked whether any of the Fellows were in the habit of using a thimble for suturing; he generally used the Glover needle slightly modified in shape, and recently he has been using the thimble with considerable satisfaction, when the skin is very tough or the tissues rather rigid. The thimble is the tailor's thimble, worn on the third or fourth finger; the tip of the finger sticks through.

DR. HARTE remarked that the great trouble with surgical needles is simply that their surfaces are made too smooth, and, as a result, they are imperfect. A harness-needle, costing fifteen cents a package, is the same as that sold at an instrument store for seventy-five cents, save that it is spoiled by being put upon a stone and polished until it is as smooth as a common needle. The needle, as received from the manufacturer, has a rough edge; this is easily felt by passing a finger over it. This needle will pass through tissue with perfect ease; but the same needle, polished upon a hone or revolving wheel, is introduced with considerable difficulty through the tissues. If one buys cheap needles one can throw them away, and that is the end of them. Needles are difficult to clean, and so, unless great care is used, the suturing material is infected; but if one throws the needle away after use, there will be no liability of infection.

DR. ALLIS rejoined that every one of the speakers said where the work was simply on the surface they did not want anything better than the fingers to manage a needle. He wished to emphasize the fact that those who only use the needle-holder in difficult places do not become masters of it. If they would use it in every place they would attain great dexterity in its use. Needles are blamed for breaking when, in fact, they have not been properly handled.

DR. MEARS said that in work on the mouth he had struggled for a long time with all kinds of needles and needle-holders, and finally adopted a long-handled needle, with a shank, to which could be attached needles of different curves. He finds that with this needle he can accomplish his work in the mouth better than with any needle-holder which he has yet used.

INTESTINAL OBSTRUCTION; RELIEF BY OPERATION.

DR. WM. J. TAYLOR reported a case of intestinal obstruction caused by a band of omentum. This was relieved by operation, and two years afterwards a second obstruction occurred, which was produced by a loop of small intestine becoming caught beneath adhesions which had formed between two coils of the bowel, evidently the result of inflammatory conditions found at the time of the first operation. Complete recovery from both operations. The history was as follows: The patient, a woman, aged forty years, was admitted to St. Agnes's Hospital on February 11, 1896. She was the mother of eight children, five of them are living. She had never been sick until two years before, when she had milk-leg following the birth of a child, and since then she has had some uterine disturbance.

On the 5th of February she was attacked suddenly with pain in the abdomen. There was vomiting and nausea, the bowels, which had been constipated, were moved by large enemata, but the pain was not relieved. On the evening of the 11th there was great abdominal distention and pain, and there had been no movement of the bowels for five days. Her general condition was very good, and it was decided to wait until the following morning before operating, and to see whether high rectal injections would not relieve her. There was up to that time no persistent vomiting, and it was not fecal. By the next morning her condition was much more serious; the bowels had not moved, nor had any gas passed, and coils of intestine could be distinctly seen through the abdominal wall, which was very thin. When the abdomen was opened in the middle line the intestines were found to be enormously distended. They were very much congested, being dark in color, and in several places the peritoneal coat was torn. Careful search was made for the cause of the obstruction, which was found to be a long, narrow band from the omentum, completely encircling the small intestine about eight to ten inches from the ileo-cæcal valve, and which passed through an opening in the mesentery, and was then made fast. The intestine was, therefore, completely encircled, as with a string, and the obstruction was complete.

This was not a very recent condition of affairs, as there were

quite a number of old adhesions, and the band must have been in position a long time, thus narrowing the calibre of the intestine. The constricting band was cut away, the adhesions broken up, and the intestine above, being enormously distended, was drawn well outside of the abdomen, packed around with gauze and towels, and an incision about two inches in length made in the wall of the gut, when a large amount of fluid fecal matter was evacuated. The wound in the intestine was closed by a Cushing right-angled suture, and over this a continuous suture of silk; a drainage-tube was introduced well down in the cul-de-sac, and the abdominal wound closed. Reaction was slow, but she made a complete recovery, and, with the exception of two small stitch-abscesses, her convalescence was absolutely uneventful. She was discharged from the hospital, perfectly well, on the 9th day of March, 1896.

On March 15, 1898, a little over two years later, she was suddenly taken with pain and vomiting and general abdominal distress. Matters continued to grow worse, and she was taken to the hospital on March 16, 1898; all her symptoms continuing, although there had been two stools, and, she asserted, wind had passed from the bowels, Dr. Taylor opened the abdomen again at the site of the old operation. The intestines were matted together by very dense adhesions, and at one point two coils of small intestine had been glued together by quite a firm adhesive band. Through the space made by the adhesions of these two coils of gut a large part of the small intestine had passed, and was constricted to such an extent that they were very dark in color, that portion above the constriction enormously distended, and directly at the point of the constriction the intestine which came in contact with the band was almost on the point of rupture. The adhesion was cut, the intestines liberated, and there was the greatest difficulty in separating the intestines from each other. This was eventually done, but at one point the wall of the intestine was torn clear through, while at two other points the outer coat alone was torn. All of these were closed with small silk sutures. The abdominal cavity was then thoroughly flushed with a hot salt solution, and about a quart allowed to remain in the abdominal cavity. The wound was then closed, iodoform dressings applied, and she was placed in bed, the foot of which was elevated after the manner suggested by Clark. Her recovery was absolutely uneventful.

The special points of interest in the report of this case are, first, the mode of constriction, which was an omental band, passing through a small congenital opening in the mesentery, and which was there, apparently, for no other purpose than to cause mischief; second, the slow onset of the intestinal obstruction; it was five days after the beginning of her symptoms before she was operated upon, and, from the appearance of the intestine, certainly four days after the obstruction began; and, third, after making a prompt recovery, she remained perfectly well and comfortable with no symptoms whatever referable to her intestines for two years, but that during that time she had been careful not to do any heavy house-work. The second obstruction began immediately after she had been washing clothes, the first work of this kind that she had attempted since her recovery from the first operation. It would, therefore, seem that the violent efforts of rubbing the clothes along the washboard had been sufficient to force the coils of intestines under the constricting bands.

In nearly all cases in which he had seen the abdomen opened a second time, after there had been any extensive inflammatory conditions involving the peritoneal coatings of the bowel, he had been astonished at the large number of adhesions and at the gluing together of the intestines. This can exist for a long time without producing any apparent discomfort to the patient. It therefore seems that surgeons should operate early in all cases of obstruction where a previous abdominal operation has been done, in spite of the fact that the symptoms at the time may not be acute, although progressive.

DR. DEAVER related the facts of a case of intestinal obstruction which had recently come under his observation, in connection with Dr. Forward, of Chester. Last summer he had been asked to see with Dr. Higgate, of West Philadelphia, a young girl who had recently graduated from the High School. She had peritonitis, with regurgitant vomiting, abdomen distended, extremities cold and clammy, pulse 140. Strange to say, she temporarily recovered without operation. He had not been able to make a positive diagnosis of the cause of the condition. She remained apparently well until later in the summer, when, after partaking of an unusually large meal, vomiting and pain with great distention came on. For four days her condition was so critical that it was believed to be useless to attempt any operative

procedure. Finally Dr. Forward changed his mind and cut down in the region of the cæcum, and found a band of omentum in which was a separated vermiform appendix constricting a knuckle of small bowel. In addition to this there were a number of adhesions. The small bowel above the seat of obstruction was greatly distended.

DR. BARTON remarked that in many cases the cause of the obstruction is trifling, though the obstruction is complete, so much so that when the abdomen is opened the surgeon may fail to find anything. He recalled the case of a woman with an umbilical hernia and strangulation, on whom he operated probably fifteen years ago. About eight or nine years afterwards she had well-marked symptoms of obstruction. He found the abdomen very much distended; the patient was lying on her back, pretty rosy, rather jolly, but every few minutes she would interrupt the conversation by expectorating reddish fluid; the bowels had not been opened and no wind had passed for several days. Operation was postponed until the next day. During the evening, while the nurse was scrubbing the abdomen in preparation for the operation, the woman said, "I am all right; it has given way." Wind passed shortly after that, and inside of an hour she had a free action of the bowel, and the next day she was practically well. Evidently in this case there was a most trifling catch, and yet it was most complete, no wind passing at all.

DR. TAYLOR added that he had a rather similar case to that mentioned by Dr. Barton. It was that of a man, who had absolute obstruction for several days, with an enormously distended abdomen. No wind passed; in fact, nothing passed the bowels. He had been in the hospital but a short time and, therefore, there had been no preparation made on the belly. While his abdomen was being scrubbed, after he was under ether, suddenly the thing gave way, and he had an enormous stool with a tremendous explosion of wind. He made a perfect and prompt recovery.

OSTEITIS OF THE TIBIA.

DR. J. EWING MEARS said that at the meeting of the Academy, in March of this year, he exhibited two skiagraphs of the right and left legs of a patient, who had recently come under his care, suffering with swelling of the lower end of the right tibia; and suffering pain, more intense at certain times, and espe-

cially during the night. The man had sustained, some five or six years previously, an injury to the lower end of the right tibia in jumping over a picket-fence, at which time the right foot was caught, the ankle-joint severely wrenched, and the inner surface of the lower end of the right tibia somewhat contused. He did not at that time apply for medical treatment, and at the expiration of a few days' rest began to use the limb in locomotion. A few weeks subsequently swelling, accompanied by pain, appeared, and these conditions had persisted, in varying intensity, since that time. He consulted medical advice and various methods of treatment were instituted under the different diagnoses which were made. Counter-irritation, internal remedies, mineral baths, change of climate, and, finally, under one diagnosis, of rupture of the internal lateral ligament, a mechanical appliance was placed upon the leg and worn for a period of nearly a year. When the patient came under the care of Dr. Mears, in February of this year, he was using crutches in locomotion, was taking anodynes to relieve pain, and his general health was very much deteriorated. Dr. Mears cut down upon the bone, making a groove two inches in length, extending from the origin of the internal lateral ligament upward, one-half inch in width and to the depth of one-half inch, with the chisel. Efforts were made with a strong drill to penetrate the cavity which was believed to exist, and at the upper end of the groove the bone was somewhat softened, but the drill, without using too much force, could not be made to penetrate. Under this condition, he contented himself with the attempt which had been made, and closed the wound. For a period of a week the pain was very much reduced and sometimes absent. After this time, however, the swelling, which had been abated, began to increase, heat and redness presented themselves as symptoms, and on reopening the wound, the point at which the softened bone was found in the previous operation, was in such condition that it was easily penetrated and pus freely escaped. The opening was enlarged, the cavity was thoroughly curetted with the spoon, and packed with 5-per-cent. iodoform gauze, the ends of the packing being brought out through the wound, and in this way drainage accomplished. This packing was renewed on the third day, and subsequently on the second day, a less quantity being used on each occasion, until the abscess cavity became obliterated and the soft tissues closed. The swelling de-

creased to such an extent that, when the patient passed from under the treatment, the circumference of the two legs at the point above the ankle was the same. The patient, as he continued to improve, discarded as soon as the wound healed the use of the crutches, and for a short period used a cane in walking.

The history of this case and the difficulties which presented themselves in the case, so far as related to the diagnosis, were characteristic. While the more marked symptoms of osteitis are easily recognized and the physical conditions assist materially in making the diagnosis, it is very often difficult to decide the question as to the presence of an abscess-cavity in the interior of the bone. The symptoms which indicate the presence of pus were frequently well marked in this case as deterioration of the general health, variations in temperature, pain of a boring or gnawing character, especially severe at night, with little or no discoloration of the surface. He used the chisel in this case in preference to the trephine, as he believed that in its use he should be able more certainly to reach the point of entrance into the cavity. The case further illustrates the necessity in these cases of making repeated efforts to penetrate the cavity; the fact that pus is not found in a first operation not being evidence of its non-existence. In this case the amount of hypertrophied bone tissue decreased sufficiently the resistance so as to permit the pus to declare its presence in more marked manner.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, November 7, 1898.

The President, J. Ewing Mears, M.D., in the Chair.

EXCISION OF THE ASTRAGALUS FOR THE RELIEF OF TALIPES EQUINO-VARUS.

Dr. William Barton Hopkins exhibited for Dr. Morton, who was unavoidably absent, the following cases:

The first child, Albert B., aged eighteen months, was admitted to the Orthopædic Hospital on April 19, 1898, with double equino-varus, the deformity being very marked, with displacement of the astragalus forward. On May 12, after division of the flexor tendons of all of the toes, and also the tendo Achillis, the astragalus was excised. The usual incision was made from near the base of the fourth toe across in a straight line to the external malleolus; the astragalus was found in advance of the tibia; both feet were similarly treated. The incisions were closed with a few sutures, ample space being left for drainage, usual dressings were applied, and the feet placed at right angles in splints, with large openings at the angles of the splints, so that no pressure should be made on the heel. The wounds healed by primary union. Perfect result followed, with good ankle motion.

The second case, Morris H., aged twenty-four months, was admitted October 7, 1898, with talipes equino-varus of the right foot. The operation similar to that already described was performed on October 10, the result being in every way satisfactory.

The third case, I. C. W., aged forty-three years, was admitted March 13, 1897, with congenital talipes equino-varus and excessive deformity, having for years walked on the upper surface of the foot. The operation was performed March 23; after the division of the flexor toe tendons, tendo Achillis, and plantar

fascia, the usual incision was made, the peronei tendons being drawn aside, the astragalus and cuboid bones were excised, and a part of the scaphoid; in fact, all bony parts which interfered with rectification of normal position were removed. Patient was discharged, with a useful straight foot, and good ankle-motion, May 18, 1897.

DR. DE FOREST WILLARD said that the term inveterate talipes varus was hardly applicable to a child of two years of age, as was one of these children at the time of operation, while the other one was even younger. In adults the removal of the tarsal bones is often the wisest course, but in young children it did not seem to him that the results obtained are any better than in the average talipes case operated on by multiple tenotomies and forcible straightening. The motion at the ankle-joint is not as good, and the removal of the cuboid, in addition to the astragalus, certainly interferes very seriously with the length and with the elasticity of the foot in later life, which is one of the important elements in the cure of any case of club-foot. It is not simply getting the foot straight, but the giving of elasticity to the step, which is so important; in young children, in the majority of cases, this can be done. In adults it is obviously, impossible, after a person has walked for thirty or forty years upon his deformed feet and the bones are thoroughly misshapen and wedge-shaped, that one could ever again obtain the proper appearance or elasticity, and the surgeon must be satisfied with a more or less rigid foot that can be planted fully and squarely on the sole. Even a considerable amount of rigidity is allowable in such cases, because a man can walk with a foot that is stiff. The question of expense in procuring an apparatus is also an important one, as is also the question of pain from corns, excoriations, and excrescences, so that the operation becomes a very valuable one in these adults. In young children under one year of age, in the majority of cases,—certainly 80 or 90 per cent.,—the operation which permits all the bones to remain in place, at the same time straightening the foot, gives in the end a better walking result. Not every case can be treated in the same way; in fact, almost every case requires a different method and must be studied individually. Some cases do better with tenotomies, others with open section, others with the removal of the astragalus, but he did not think that the removal of the astragalus and cuboid should be at

all a routine operation in young children; on the contrary, it should be employed at this age only in exceptionally rigid cases.

THE IGNORANCE OF SURGEONS REGARDING FRACTURE OF THE LOWER END OF THE RADIUS.

DR. JOHN B. ROBERTS said that in an article on fracture of the base of the radius, published in a New York journal a few months ago, the author, a professor of surgery, stated that skiagraphic investigation showed that these fractures of the radius were frequently associated with transverse fracture of the head of the ulna. The statement would, perhaps, have gained professional acceptance had the author not reproduced the skiagraphs on which his opinion was based, and given the ages of his patients. These details made it evident that the supposed fracture was the skiagraphic picture of the normal unossified epiphyseal cartilage between the shaft and lower end of the ulna.

Some weeks ago he incidentally saw a fracture of the lower end of the radius under the care of a well-known surgical teacher and writer. It was being treated with anodyne lotions and a Bond splint. In Dr. Roberts's opinion the fracture was the usual injury with backward displacement of the lower fragment; it had not been reduced, and it ought to have been immediately subjected to sufficiently great force to drive the upper fragment down into position, even if anæsthesia was necessary for the accomplishment of this essential step. When he stated his opinion, the surgeon in charge, to his profound astonishment, said that he believed the fragments were partially impacted; that the position was pretty good; that he preferred to leave such cases alone, since manipulation, such as was proposed, would probably increase the mobility at the point of fracture; and that a compress over the elevation due to the displacement might perhaps be judicious. The surprise of the speaker at these statements can scarcely be expressed. That fractures at the base of the radius must be reduced; if deformity, protracted convalescence, prolonged rigidity of joints, and pain are to be avoided, was, he had thought, accepted by every surgeon of the present day. That a compress, applied over the deformity due to impacted and unreduced fragments, was a futile substitute for the muscular force to be exerted on first seeing the injury was, he supposed, recognized by all surgical teachers.

His arguments, supplemented by a diagram giving his idea of the bony conditions present, failed to convince his colleague of the danger of inaction; and, as he had no professional connection with the case, he retired from the room before the splint was reapplied to the unreduced fracture.

These two instances are sufficient evidence that much that has been learned regarding the anatomy, pathology, and surgical therapeutics of radial fractures during the last ten or fifteen years needs constant reiteration in journals, societies, and class-rooms. Ignorance of scientific progress in fields somewhat different from those in which men are working may lead them to incorrect conclusions; or the want of time during the busy days of professional life may prevent them paying sufficient attention to the progressive developments of clinical and experimental observation.

It has been his experience to be obliged to set many fractures of the lower end of the radius, which had previously been put up in splints without reduction of the displacement. This oversight he has found very prevalent among general practitioners and resident physicians in hospitals. He has attributed the neglect to reduce the fragments by the former class to the teaching of twenty years ago, when the pathology of the lesion was misunderstood; by the latter to insufficient attention to the instructions of their surgical teachers.

He has learned to never expect to see the fracture completely reduced by resident physicians and general practitioners. Some of them, however, do appreciate the supreme importance of immediate and complete reduction and accomplish it; and in other instances the fracture has been attended with little or no displacement, and the neglect to reduce the fragments is not demonstrable.

He has now come to feel that perhaps the oversight in recent graduates is due to the fact that their teachers do not insist upon the importance of reduction; and that undergraduate students do not see this fracture properly treated in the clinical amphitheatre and class-room.

These reflections had induced him to present for discussion by the Academy of Surgery the present topic; for he knew that much physical suffering would be avoided and the surgical art advanced by having the young graduates, whom the Fellows of

this body teach, impressed with the idea that failure to reduce, as soon as possible, a fracture of the base of the radius is an injustice to the patient and an opprobrium of surgery.

In conclusion, he stated his position in regard to this fracture in five propositions, upon which he solicited discussion.

(1) Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat.

(2) The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing.

(3) Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week.

(4) Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment.

(5) These assertions are only justified when the surgeon insists upon forcing the lower fragment into its proper anatomical relation with the upper fragment. This is to be done by the exercise of such a great amount of force as will break up all impaction or entanglement and bring the broken surfaces into accurate coaptation. This sometimes, but not usually, requires general anæsthesia; and may demand that the surgeon bend the broken bone across his knee in order to disentangle the interlocked fragments.

DR. W. B. HOPKINS said that surgeons to out-patient departments of large hospitals had peculiar facilities for familiarizing themselves with the best methods of reduction and treatment of fractures of the lower end of the radius. From his own experience, during fourteen years' attendance at the Out-Patient Department of the Pennsylvania Hospital, where as many as thirty-eight and even forty-two fractures of the lower end of the radius have been treated in one month, the importance of reduction was so thoroughly recognized that any dressing which had been applied elsewhere was immediately removed and the deformity forcibly corrected. Referring to a paper by himself in the *Philadelphia Polyclinic* of May 15, 1886, he quoted the following paragraph:

"*Reduction.*—The importance of immediate and as perfect reduction as possible, even if it is necessary to use an anæsthetic for its accomplishment, cannot be over-estimated; and it must

be borne in mind that what appears to be slight malposition at first will steadily and surely pronounce itself as the swelling subsides, and when it is too late to reduce it by either sudden or gradual means, an ugly fork-shaped deformity will frequently present itself, if complete reduction has not been performed at the beginning. The fragments can usually be brought into accurate apposition by direct and forcible pressure and counter-pressure with the thumbs and index-fingers, and, once in place, very rarely show any tendency to become disarranged."

Regarding the after-treatment, he believes a state of absolute rest, of not only the forearm and hand but also the fingers, during the period of traumatic inflammation, interrupted only by the surgeon's visit, when every joint is to be gently but fully extended once, pronated and supinated fully once, the fracture meanwhile being properly supported, is a method based upon sound principles, and one which in practice he knew to be satisfactory. With regard to the dressing, it must be borne in mind that the lesion produced by a force sufficient to cause this fracture is not confined to the bone alone; the tendons, their sheaths, blood-vessels, fasciæ, and ligaments are liable to any extent of bruising, stretching, or tearing, and the mere fact that the fragments of the radius have been reduced and usually remain locked in place does not negative giving the wrist at least as much care as if it were sprained. He could hardly understand, therefore, Dr. Roberts's willingness to allow a patient with fracture of the lower end of the radius to go about with no more support or fixation than is given by a broad band of adhesive plaster encircling the wrist. The broad band of adhesive plaster, if applied with sufficient tension to give any support, is liable to cause, during the stage of ascending inflammation, swelling of the distal portion of the extremity, which latter increases the tension, and consequently the constricting effect of the band, with a result which, if uncared for, might be disastrous.

Dr. H. R. Wharton agreed with Dr. Roberts as to the importance of complete reduction in fractures of the lower end of the radius. He disagreed with him, however, as to the ease with which this is accomplished. He thought that in some cases it is almost impossible to get complete reduction even under anæsthesia, the bones interlocking, making complete reduction almost impossible. This is shown in many cases under careful treat-

ment, where, after recovery, very marked evidence of deformity is seen. In spite of the greatest care in treatment, cases do occur in which it is almost impossible for a patient to have much function in the arm for a long time. He had seen cases carefully treated in which the reduction of the deformity apparently had been very carefully practised, and in which there was a great deal of pain and stiffness in the wrist and fingers. In a great many of these cases he thought the fault did not lie in the fact that there is a certain deformity of bone, but that the patient is either of a gouty diathesis, and this injury is the exciting cause of irritation about the seat of injury, or in some cases there is distinct neuritis. In such cases there will be seen glossy fingers and redness of the skin following fracture of the radius, in which a reduction has been so thoroughly accomplished that it is impossible to say there is a distinct deformity. This condition occurs often in women advanced in life. In children a fracture of the radius is more satisfactorily treated; here the injury often consists in a separation of the lower epiphysis. In such cases reduction is accomplished without much difficulty, and the deformity is very slight and the functional result is very good. It is a mistake to attribute all bad results in this fracture to carelessness of the surgeon in reducing the fragments. In spite of the greatest care in reduction, in certain cases, a bad functional result in fracture of the lower end of the radius will follow. He agreed to a certain extent with Dr. Roberts that the treatment of fractures of the radius is generally satisfactory, although some cases may suffer pain and have rigidity of the fingers, but eventually they get good use of the hand.

Then, there is another question, that of pronation and supination. In a great many of these cases pronation and supination are more or less interfered with, in spite of what appears to be complete reduction. The antero-posterior deformity may be reduced, but there may be a lateral displacement of the fracture, which interferes with pronation and supination. It is the exception when one examines a case of healed fracture of the lower end of the radius that one cannot tell from the appearance of the part that such an injury has occurred. One sees a little adduction of the hand and a little undue prominence of the styloid process of the ulna. This is due possibly to some displacement of bone,

but it may be due to natural shortening of bone in union. There is always some slight shortening in the process of repair of bone.

DR. TAYLOR instanced one case under his care, a boy seventeen years of age, with a fracture of the lower end of the radius. He used the fluoroscope and examined it with great care and found the fracture. There was a certain amount of deformity before he reduced it. He again examined it with the fluoroscope and the reduction was seen to be absolutely perfect, both from above downward and laterally. He then placed it on a splint, holding it with great care, and bandaged it to the splint, and then examined it again. He now found that in the interval between the placing it on the splint and applying the bandage there had been a certain amount of displacement. He again took it off, reduced the deformity, and bandaged it again, using more care than before. Now, with the fluoroscope, the reduction was seen to have remained perfect. The result was excellent. This case illustrated the possibility of a recurrence of the deformity no matter how perfect the reduction of the fracture; and since it is manifestly impossible to say what one will recur and what one will not, he therefore much preferred using some form of splint that would keep the hand and arm quiet—the wrist and arm—for a number of days.

DR. JOS. HEARN said that he had never found difficulty in retaining this fracture in position when he got the fragments reduced. The late Dr. Levis called his attention to the ease with which he could reduce them by bending the wrist backward. Once they are in place they stay there, as a rule. Moore, of Rochester, treated his cases by a compress and suspending the patient's arm in a sling, and letting it hang in that position. It had been his experience that when he got them reduced they are very easily retained, so that he never had one to change position. He insisted on the patient taking an anæsthetic in order that he might properly reduce the deformity.

DR. MEARS alluded to the practice of fifty years ago. As is well known, great interest was taken at that time in the treatment of fractures at the lower end of the radius. It was a matter of great moment to make the diagnosis so as to ascertain whether it was a classical Barton fracture or Colles's or Smith's. The splint which was universally used was that of Bond. He had met with two instances in which the splint was applied without any effort being made at reduction of the fragments. It might be interest-

ing to know whether, in the numerous cases which had come under the care of Dr. Hopkins, in the Pennsylvania Hospital, and under the care of Dr. Roberts, many of them had been the Barton fracture. He had a case some years ago, in St. Mary's Hospital, of this variety of fracture, in a lad some sixteen or seventeen years of age, where, as the result of a fall from the fourth story of a factory, the fragment was displaced four inches above the joint, and was clearly defined in its position.

The question as to the character of the dressings applied in the cases reported is of great importance, and should receive careful attention in the discussion of the subject.

DR. G. G. DAVIS said that Dr. Roberts had submitted four definite propositions. The first was, "Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat." He thought some people consider that fractures are all more or less unsatisfactory, and he would agree with Dr. Roberts in this first proposition, that it is about as satisfactory as other fractures.

The second proposition was, "The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing." He believed it was exceptional for the discomfort to be limited to a period of twenty-four hours; they have discomfort for a longer period.

Third proposition: "Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week." That would indicate that in the treatment (he does not state here that union would be complete in a week's time) the other symptoms of fracture, such as stiffness and pain, are absent after a week's time. His experience had been that the stiffness does persist after a week's time. There are certain cases—perhaps a considerable number—in which there is no tendency to deformity, and in which massage can be employed with advantage almost daily from the first. In such a case there is rapid restoration of flexibility and function; otherwise it takes longer.

Fourth proposition: "Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment." On this head he thought that the point already made by Dr. Wharton, that the projection of the ulna is usually evident,

was well taken. He believed there were few cases where some deformity was not present,—that is to say, a slight antero-posterior deformity or some slight shortening, sufficient to pass the hand slightly towards the radial side.

As to the treatment of the fracture, he would hesitate about allowing any fracture to remain unsupported without something to bridge over the line of fracture, whether there is a tendency of the deformity to recur or not, and in his opinion this could be most neatly done by the single straight splint on the back of the wrist. He also commended the plan of Roser, who used a posterior splint and allowed the hand to hang, the hand hanging down and the splint projecting beyond the wrist, the triangular interval being filled up with a wedge-shaped pad, so that the hand was carried in a flexed position. He had not always found this fracture easily reduced. He remembered very well one case in which it was impacted so hard in a stout man that, in spite of an anæsthetic, and the greatest effort of which he was capable, he was unable to reduce the impaction. There are other cases, however, in which by sharply flexing and adducting the hand, bending it towards the ulnar side and sharply flexing it over the knee, and with a dragging motion one is able to bring the fracture down.

HOT AIR IN JOINT-DISEASES.

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My experience with the use of superheated air has extended over a period of two years, and has embraced a wide range of conditions of the joints, with failure, disappointment, partial successes, signal benefit, and in some cases results that were thoroughly gratifying.

The exaggerated statements that are sometimes made would lead one to believe that hot air will absolutely cure every known lesion, but after continual disappointments have accompanied efforts to cure incurable conditions, one naturally finds that certain conditions appear to be benefited and others undoubtedly relieved, while there are a few that are really cured.

The ovens that I have used are the Betz and the Lentz make. The Betz oven is heated over an alcohol lamp, with a three-inch sheet-iron pipe communicating the heated air directly from the lamp to the interior of the oven, direct contact with the patient being avoided by a shield running the length of the oven. A vent-hole in the top of the oven controls the flow of heated air, which is still further controlled by a damper in the sheet-iron inflow pipe. A thermometer is inserted through the top of the oven into the interior. The part to be heated is, after thorough wrapping, placed within the oven upon a canvas support regulated so that it will be approximately equidistant from the sides of the oven.

During my earlier experience with this oven I met with two accidents, neither of which proved serious, although

sufficiently alarming at the time. The first one was caused by the open lamp, nearly full of alcohol, upsetting while lighted, and spreading flames on the floor. Fortunately, the patient had not yet had her arm put in the oven, otherwise her skirts could not have escaped. Immediately after this I abandoned the open alcohol lamp, and used a small gas stove with equally satisfactory results, and without the danger attending the use of alcohol.

The second mishap occurred while using alcohol, and was caused by the flame passing up through the ingress-tube and setting fire to the cotton wrapping around the patient's leg. The draught-hole in the top and the damper were immediately closed, which smothered the fire, and the patient's leg hurriedly withdrawn from the oven. The oven in cases of application is usually placed upon a chair, so that the distance from the top of the lamp to the patient's leg is only about twelve inches, which will account for the flame shooting up with the direct draught and igniting the inflammable cotton. Since the above accident I have always used flannel instead of cotton.

The Lentz oven is arranged for gas, having Bunsen burners underneath, heating a metal plate which is in contact with the bottom of the oven. In this apparatus the flame cannot enter the interior chamber or come in contact with the patient, but when the bottom becomes red hot, it is possible to scorch or burn the patient, as I found in several cases before I abandoned the use of cotton. Three patients have been burned or, more properly speaking, scalded, in the use of the ovens in the hands of myself and my assistants. They have all occurred after the ovens had been in use for about a half hour, and were, I believe, due to the cotton becoming saturated with perspiration, which, becoming hot, scalded the patients. This has never occurred since I have used flannel to envelop the limb and exercised the utmost care to avoid the accumulation of moisture within the oven.

Recent experience has shown the great value of humi-

dine, a preparation made by the Pennsylvania Salt Manufacturing Company for the purpose of absorbing moisture in refrigerators. While the proper use of the ventilation-holes in the Lentz ovens does much to get rid of the excess of moisture, resort to them too frequently cools off the interior to a sufficient extent to make it difficult to obtain and maintain the highest degree of heat. The higher degrees of heat cannot be borne by a patient if the parts are wet, and very excessive wrappings about the limb prevent the heat from reaching the parts, therefore the use of humidine greatly facilitates the use of the oven in that it avoids the danger of scalding the patient and permits the use of lighter wrapping of flannel.

I have in my possession one other oven that was used extensively, more than forty years ago, by an irregular practitioner. It is a double-sleeve arrangement, the space between the sleeves being made to permit the passage of steam around and in contact with the interior sleeve, thereby heating the interior cavity into which a patient's limb is inserted. The limb, after being inserted, is held in place by a rubber enveloping and constricting arrangement to make the cavity air-tight. A small tube communicating with the interior cavity is provided, so that by means of an air-pump a partial vacuum is obtained and maintained around the limb. By means of the air-pump the excess of moisture is, of course, removed, but as steam at 212° F. could not heat the interior cavity above that point the patients were unable to obtain the benefits that are now ascribed to the use of temperatures approaching 400°.

I have found it expedient to have the personal attention of a physician during the time of use of the oven, for there is great room for discretion in its use. It has usually been found impossible to have the patient bear the heat of over 300° to 320° at the first sitting, and I cannot say whether or not the patient is influenced by the mental astonishment at the audacity of using a higher degree of heat than steam, which is known to be destructive. The second application is

usually accompanied by no untoward events, and this may be based upon the placid condition of the patient having passed through the first ordeal without being cooked or scalded, and with sufficient appreciable benefit to be encouraging to the hope of ultimate recovery.

Acute sprains of the knee, ankle, wrist, and elbow have appeared among the most favorable cases when seen shortly after injury, and excellent results have been obtained even after a considerable time has elapsed. A typical illustration is afforded in my own person. In falling from my bicycle I struck the palm of my hand in the position that so often results in a fracture of the lower end of the radius, but which, in my own case, caused only a very severe sprain. Within an hour I placed the hand in the oven, carrying the heat to 380°, during an hour, and repeated it in twenty-four hours. Pain subsided while in the oven the first time, and entirely disappeared at the second. The wrist was kept quiet for thirty-six hours, and no recurrence of pain or inconvenience has occurred. The well-known use of hot water in similar cases was the cause of my resorting to the oven in this case, and with most gratifying results.

My greatest disappointments have been in cases of both acute and chronic gout, rheumatism, and rheumatoid arthritis. I have not only not been able to relieve to any appreciable extent the pain or modify the evidence of inflammatory action, but in a large number of cases the existing conditions seemed to be made worse by the heat. In but one case was there decided relief from pain obtained, and in that one there was a possibility that the condition was not that of a beginning acute attack of rheumatism. The patient had for years been subject to acute inflammatory rheumatism, running from joint to joint, with a period of subsidence of one year. Awaking one morning with what appeared to be a recurrence in the wrist, the presumption was that this was the beginning of one of the severe attacks so greatly dreaded. The oven was used for an hour, the temperature gradually rising to 380° F., during which time the severity of the pain

gradually subsided, until at the end of the hour the wrist was entirely painless, and there has been absolutely no recurrence for three months.

Hydrarthrosis appears to offer a field of usefulness, in that the effusion often rapidly disappears, either because of the local sweating or by the increased power of absorption; the tension upon the joint being removed, the pathological process which caused the effusion is placed in a favorable condition for resolution. I have found that rather lower degrees of heat, kept up for a longer time at each sitting, produced the best results, and, by comparison, I should suggest the use of a temperature of about 300° continued for two hours. The use of a degree of heat of 380° to 400° for one-half to one hour, while well borne by patients, did not produce an equal amount of sweating, and therefore did not appear to me to be as beneficial as the lower temperature mentioned. I have found it impossible for the patient to bear the pain of the high heat of 360° to 400° when the parts are wet with perspiration, while the lower degrees, ranging from 250° to 300°, are easily borne, without inconvenience even when the enveloping flannels are saturated. It, therefore, is apparent that for sweating purposes high degrees of heat are not applicable, and are apt to be followed by more or less severe scalds.

Fibrous ankylosis is the field that I have found the most susceptible of benefit from the application of extreme heat. Joints that have become more or less firmly ankylosed as a result of acute inflammatory and traumatic synovitis, or from disuse following an injury, appear to soften under the high degrees of heat, very much in the same way as old glue will soften when heated. This softening of bands of adhesion is often most marked, as evidenced by repeated experience in breaking up ankylosed joints. While the parts were at the accustomed temperature the joints would often appear to be ossified. An hour with the temperature starting at 300° and rapidly running up to 380° to 400°, with occasional ventilation to get rid of the excess of moisture from perspira-

tion, was almost always followed by such a change as to enable manual efforts alone to move the joints 10 to 15 degrees, and by powerful mechanical appliances to 20 to 45 degrees, and it must be noted with comparatively little pain either at the time or following. It has not been an unusual occurrence to have patients walk several squares immediately after a stiff knee has had free motion imparted to it from 20 to 45 degrees. Within an hour after heat and manipulation some of the former stiffness would recur after the first two or three applications, but gradually with the full co-operation of the patient and the re-establishment of muscular co-ordination, the freedom of the joint increased. Fifty applications, made upon alternate days, has been the greatest number in recovering ankylosed joints, and this was in a case of an ankylosed knee of two years' standing. It is not to be expected that a normal joint can always be reproduced, but it is a decided gain over an absolutely stiff joint to have even 5 degrees of motion.

Numerous failures have occurred in cases of ankylosis which have been broken up and a considerable amount of motion obtained, but in many the manipulation was sufficiently painful to require more courage than the patient possessed. The rapid and transitory anæsthesia by ethyl bromide has been employed, and a painless passive motion instituted after the use of the oven, but occasionally the subsequent pain was unendurable and the treatment abandoned.

Under the heading of ankylosed joints may properly be mentioned the cases of inveterate flat-foot that have yielded to correction by the use of high degrees of heat, approaching 400° F., and followed by powerful mechanical manipulation. Many of these cases have had corrective pressure by means of a screw applied to the extreme point of endurance, and it has been astonishing to witness the efforts of patients to stand even more pain from mechanical force as they witness the arch of the foot being reformed, and they realize that their disability is gradually disappearing.

A large experience with the oven in cases in various

stages of tubercular disease of the bones and joints inclines me to view this method favorably, although time enough has not yet elapsed to make definite statements as to its permanent value. It appears, however, to be a rational deduction that the softening process that enables a fibrous ankylosis to yield, and the rapid disappearance of effusion about a joint would present favorable conditions for absorption and repair in tubercular invasion. The necessity of maintaining immobilization must not be overlooked, and the well-known favorable results and absolute recoveries produced by immobilization without the use of the oven naturally induces a hesitation to credit the oven with the benefits accomplished when both methods are employed.

I believe that decided and appreciable benefit has been obtained in tubercular arthritis by recourse to the highest degrees of heat, but when sufficient time has elapsed to justify a definite statement based upon time and results, the presentation of the subject will be other than it must necessarily now be,—a preliminary consideration.

The subject under discussion may be summarized as follows:

(1) The highest temperature (370° to 400°) is possible only when the patient is well covered with flannel and the moisture kept to a minimum.

(2) The highest temperature is applicable to ankylosis and tubercular joints.

(3) The lower temperature (250° to 300°) is of use in sweating, and may be maintained for two or three hours daily.

DISCUSSION.

Dr. De Forest Willard said that he had employed this treatment largely during the past year, both in private and hospital practice. His experience is similar to that of Dr. Wilson in fibrous ankyloses, in the plastic exudates following fractures, and in other injuries about the joints. High heat is one of the most helpful agents in producing absorption and in diminishing the resulting stiffness which is so common in adhesions in the ten-

dons, in the sheaths, in the muscles, in the soft parts, or in the bone itself, and in recent sprains and injuries.

In regard to arthritic troubles,—rheumatic and gouty ones,—in the rheumatic individuals, in the majority of cases, this treatment has been satisfactory. In some gouty conditions it has been very comforting and certainly a relief to the individual. In regard to tubercular joints, he had been very cautious in reference to its employment. Theoretically there is great danger of disseminating tubercular bacilli or ptomaines by the carrying onward of the germs by means of increased circulation. In this way one may do more harm than good.

THREE UNUSUAL COMPLICATIONS OF HERNIA.

Dr. J. Chalmers Da Costa reported three cases of hernia presenting complications of an unusual sort.

The first case was a man with an extremely large hernia,—an enormous hernia. He was well aware that the trend of surgical opinion is that it is not justifiable to operate, as a rule, upon enormous herniæ. In the first place, it is very difficult to reduce such a hernia after incision, the protrusion, in the words of Petit, having sacrificed the right of domicile in the abdomen. In the second place, operations of such a character are dangerous; and, in the third place, such operations are unsatisfactory, the hernia tending to return. Had he been brought in contact with this case and had found that no complications existed, he would not have attempted operation. When this man was brought into the Jefferson Hospital, a year ago last May, the hernia was obviously in a condition of either beginning strangulation or incarceration. The patient was forty-nine years of age, a hat-blocker by trade, and his occupation required him to work with considerable force a lever which moved some machinery. He first noticed this hernia when he was fifteen years of age, and it had grown of recent years with a great deal of rapidity. He suffered chiefly from its excessive weight; he could not wear any arrangement to hold it up, and his work was interfered with. Three days before admission pain began in the hernia and there was a very great amount of pain in it. The pain was in the mass and was associated with colicky pain throughout the abdomen.

There had been absolute constipation for several days; there was nausea, but no vomiting, and the hernia was very tender to the touch. Upon opening the sac, it was found to contain the appendix, the cæcum, most of the ascending colon, considerable of the ileum, and an enormous mass of omentum. A portion of the ileum was found deeply congested and strangulated; it was twisted and firmly adherent to surrounding structures. The great bowel lay to the outside and to the posterior portion of the sac. It was a question whether the sac was complete at this portion or not. The adhesions were separated, hot saline fluid was applied to the bowel, and the natural color returned. A great mass of omentum was removed, and it was found to reach from the tip of the operator's fingers to the elbow when spread out. An attempt was made to return this hernia into the belly, and it was found to be most difficult to accomplish. In fact, it was effected by main strength. The surgeons and assistants stood upon stools, and, with what appeared to be an almost ferocious attack upon the hernia, succeeded in restoring it to the abdominal cavity. The peritoneum was sutured, as in a laparotomy wound, and a sort of Bassini operation was made, necessarily of a very crude description, because of the atrophied condition of the tissues. The patient made a satisfactory recovery. At present, one and a half years after operation, there is a slight relapse of the hernia, but not a large one, and it is readily manageable by a truss. Since this operation he has developed an umbilical hernia, but not of a large size. At the present time the umbilical hernia is not larger than a walnut, but is growing, and has ample prospects for the future. A truss has been placed over the umbilical hernia, and a truss over the inguinal hernia, and both protrusions are kept satisfactorily reduced.

The second case was a young man, twenty-two years old, who came into the service of Professor W. W. Keen at the Jefferson Hospital, and was turned over to him for the purpose of performing an operation. The man had had a marked inguinal hernia of the left side for a number of years; but it never gave trouble and he never wore a truss. Some thirty-six hours before admission it became strangulated; he was attended by a physician, who placed an ice-bag on it, administering morphine, and made several attempts at taxis. These attempts were futile. The patient was brought into the hospital. There was a considerable

amount of tympanites, and he occasionally vomited a greenish fluid, which was not stercoraceous. There was pain and tenderness in the hernial mass, and absolute absence of impulse on cough. To reach the constriction and cut it the long incision was made. This permits of a thorough inspection of the parts and renders easy a subsequent radical cure, and its merits have been pointed out by Mr. Lockwood. The sac was opened and the constriction cut at the internal ring. A small portion of the small bowel was in the sac, it was in good condition, and was restored. It was decided to do a Halsted operation. On lifting up the cord for the purpose of removing the accessory veins, which were large, it was noticed that there was a blood-clot running for a long distance along the accessory veins of the cord. Ligatures were applied above and below, and the portion of vein was cut away, when it was discovered that the clot was purulent. Cultures were at once taken, and it was shown by subsequent studies in the laboratory that there was present the staphylococcus pyogenes albus. A radical cure was made, but it was considered expedient to pull the stumps of the veins into the wound and anchor them there, after disinfection with pure carbolic acid. There were no complications, but a few days after the operation it was discovered that the patient labored under a chronic urethral discharge. Cultures were taken and gonococci were found present. The problem in this case is, Was the phlebitis, with an infected clot of accessory veins, connected in any way with the existence of the previous gonorrhœal discharge, or was it due entirely to taxis carried out at such a recent period establishing a point of least resistance.

In the third case there was a complication still more unusual. This man was forty-eight years of age, a laborer, who suffered from a prolapse of the mucous membrane of the rectum. He was operated on in the Jefferson Hospital a number of weeks before by the use of a cautery, but the operation had failed to cure the prolapse, and he came again into the hospital for the purpose of having it removed. He had had for a considerable length of time a reducible hernia of the left side. The prolapse was excised and the mucous membrane sutured. He did very well for three days, except that he coughed a great deal. On the evening of the third day, while having a violent attack of coughing, he was seized with pain in the abdomen, and found that the rupture had come down,

that it was painful, and that he was unable to reduce it. He called for the resident physician, who made an attempt to reduce it, but failed. While manipulating the hernia the resident physician was surprised to hear and feel a crackling, when he pressed on the mass, as if air were diffused through the tissues. On reaching the hospital Dr. Da Costa examined into and confirmed this fact. There was distinct crepitation which could be heard and felt. It seemed to be deep within the sac. This crackling could be traced from the left side to the right side, apparently along the course of the colon. The question as to what had happened was doubtful. The first thing thought of was that some stitches which were put in at the operation had given way, and that during the fits of coughing air had been diffused into the subserous tissue. On examining the stitches they were found intact. Inability to reduce the hernia determined operation. An incision was made, the hernia was exposed, the sac was opened, and the hernia was found to be composed of the large bowel, and within the mesocolon was a collection of air which crackled when pressed on; it contained air in what looked like bubbles, opalescent bits like large globules of milk. Dr. Da Costa introduced his hand into the abdomen and was able to discover that the ascending, transverse, and descending mesocolon, and the mesorectum were in the same condition. In fact, the distention was so great downward towards the pelvis that it was difficult to pass the hand. The wound was closed, and again examined. Upon examination of the rectum there was found above the lines of stitches an ulceration which had apparently followed the cauterization, and when the bowel was pressed upon air escaped from the ulcer in distinct bubbles. A tube was introduced into this opening and carried into the subserous tissue, and in the course of four or five days this very large collection of emphysematous material passed away and the individual recovered. It is very strange that no infection of the subserous tissue followed.

TWO CASES OF HYPERTROPHY OF THE PENIS; ONE DUE TO TRAUMATISM; THE OTHER, TO ELEPHANTIASIS.

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THE origin of hypertrophy of the penis is not yet understood; from cases that have been reported to the medical profession, the disease would seem, in some manner, to be associated with injuries to the lymphatic vessels. Robert W. Taylor gives an account of a case where the organ grew to the length of eleven inches, the circumference being proportionately increased after the individual had received a gunshot wound of the lymphatic vessels of the groin. Many instances of hypertrophy of the corpora cavernosa have been detailed; in the *Medical Times* for January, 1875, there is the case related of a man thirty years of age. The organ had commenced to enlarge, when the individual was a boy of six years of age; the integument over the penis being normal.

In the case of the person who came under my charge enlargement seemed to follow traumatism; its history is briefly as follows:

He is an acrobat, thirty-eight years old. Has always enjoyed good health; his family history is negative so far as abnormalities, tumors, or malignant diseases are concerned. Has never had any venereal disease. At the age of twenty-five the organ was of normal size. He is married and his wife has borne him two children.

Shortly after his marriage he observed that when he donned

FIG. 1.—Hypertrophy of the penis due to traumatism.

FIG. 2.—Elephantiasis of the penis, before operation.

FIG. 3.—Showing result after removal of hypertrophied tissue in case of elephantiasis of the penis.

his tights, in which he appeared during his exhibitions, that his appearance was quite unseemly. In order to rectify this condition, he devised a harness so adjusted that he could strap the penis to the scrotum between his testicles. For several years he utilized this apparatus when he appeared in the ring; but frequently when performing his gyrations the organ would become twisted, causing pain, tenderness, and swelling, lasting for several days, followed by a subsidence to his normal condition.

After using the apparatus for the space of two years he observed that the organ was increasing greatly in size. This condition was unaccompanied by pain. Finally sexual congress became impossible. Some three weeks before presenting himself at the hospital while attempting to turn professional somersaults with the organ strapped between his legs the foreskin was wrenched, bruised, and slightly chafed; this condition was followed by inflammation and œdema of the prepuce, with suppurating periadenitis of both groins. He begged to have amputation of the penis performed, as the size and weight of the organ had become so great that it was impossible for him to carry on his business.

The penis was of gigantic size; it was of normal shape; the enlargement was uniform; the skin perfectly smooth and healthy, moving freely over the subcutaneous connective tissue. There was no tenderness on pressure. There was an acquired phimosis, with enlarged suppurating glands of both groins. The length of the organ from the pubis to the end of the prepuce was ten and one-half inches; the circumference at the middle of the body was nine and three-quarters inches. (See Fig. 1.)

The patient was circumcised, and on removing the foreskin an enormously developed but perfectly healthy glans was brought into view. The tissue forming the foreskin was normal, and no more bleeding took place than was natural. The glands of the groin were removed without difficulty. Microscopic examination of the foreskin discovered nothing abnormal. The individual recovered promptly from the effect of the operation without any untoward result.

The differential diagnosis between hypertrophy and elephantiasis of the penis was readily made in this case. The organ had preserved its normal shape, and was symmetrically enlarged; the skin was smooth and normal in appearance and

not attached to the subjacent structures, while in elephantiasis there is always hypertrophy of the fibrous structure as well as of the subcutaneous connective tissue; the skin being thrown into numerous furrows running in longitudinal directions and crossed by other furrows which divide the skin into firm, brawny, and elastic nodules. Finally, in elephantiasis the glans is not enlarged, and is generally hidden in the lobular skin of the prepuce, presenting an umbilicated appearance.

Elephantiasis of the Penis.

Elephantiasis is rarely met with in America or Europe, but sporadic cases are occasionally seen. In the tropics, however, it is often found, and is frequently endemic to certain districts, attacking the organs of generation of both sexes, next in frequency after the lower extremities.

The disease appears to be a hypertrophy of the fibrous tissue of the skin and subcutaneous connective tissue, attacking the last-named structure first. This is followed in time by an increase in the size of the neighboring organs, disturbing the circulation, and giving rise to chronic inflammation of the lymphatic vessels of the part.

It is very unusual for elephantiasis to attack the penis primarily, but it frequently follows involvement of the scrotum. Dr. Thin, in the *Transactions of the London Pathological Society*, 1880, gives a case of elephantiasis of the penis, where no appearance of a multiplication of cells by division could be detected under the microscope, and hence infers that the whole of the cells are derived from the white blood-corpuscles. Lewis, Bancroft, Manson, and Henry have of late years pointed out that elephantiasis, if not caused by, is at least frequently associated with, the presence of a parasite, the filaria sanguinis hominis, of which there are three varieties,—filaria diurna, filaria nocturna, and filaria perstans. Of these three divisions it is probable that the filaria nocturna, which gives rise to certain forms of elephantiasis as well as the conditions known as lymph-scrotum and hæmatochyluria, is the most common. The embryos in tropical cases are present in the

blood in large numbers at night and almost entirely absent during the day. Stephen Mackenzie asserts that if the patient sleeps during the day and is awake at night the condition is reversed. Osler states that these parasites cannot be found in every case of elephantiasis, and reports two cases coming under his own observation where filaria in the exuded fluid or in the blood at night could not be detected. He further observes that the majority of cases of elephantiasis which occur in this country are non-parasitic, while the directly opposite condition pertains in cases occurring in China. The parasite is found principally in tropical climates, and, according to the observations of many American writers, it exists extensively in the Southern States. The filaria sanguinis hominis appears in the blood in its embryonal form, and is fully developed only in the lymphatics.

The scrotum is more frequently the seat of the disease than the penis; this organ, as a rule, being affected secondarily. Two cases are reported involving the penis alone, one by R. W. Taylor and the other by R. F. Weir, of New York. In Taylor's case the patient was a young Hebrew, in whom the condition followed an injury to the organ. In Weir's case the hypertrophy followed a stricture of the urethra associated with an abscess resulting in a urinary fistula.

The history of the case which came under my care is briefly as follows:

The individual was a colored man, about forty-five years of age; sailor by occupation. Family history negative. Patient states that he never had any venereal disease. About six months before coming to the Philadelphia Hospital, while at sea, having abstained from sexual intercourse for four months, he noticed a small, slightly elevated, hard lump, about the size of a pea, on the left side of the frænum. This lump increased slightly in size, became irritable, and ulcerated at the base, from the necessary friction produced by coming in contact with the clothing. Gradually sloughing set in until the tumor hung by a strip of skin which he cut through with a pair of scissors; the resulting raw surface healed rapidly. About three weeks later the entire penis

began to enlarge until it gradually reached its present dimensions. He has never had any pain or experienced any difficulty in urination. He has lost slightly in weight.

On examination the glans penis was small and almost entirely hidden by a firm fibrous mass which entirely surrounded the end of the organ. Between the penis and the scrotum there was a distinct line of constriction, the skin of the latter being perfectly normal. The left testicle was easily discovered, but the right testicle could not be found, and was supposed to have undergone atrophy. The skin of the penis was cut up into furrows, running longitudinally, which were crossed by others running more or less obliquely, dividing the organ into lobules, which were hard, firm, and elastic. (Fig. 2.) From the pubis to the glans penis, along the dorsum of the organ, the measurement was eleven inches. The circumference of the mass in its thickest portion was nine and one-half inches. On palpation a distinct doughy sensation was imparted to the touch, but there was no pitting on pressure. A very careful study of the blood was made by my colleague on the staff, Dr. F. P. Henry, but the filaria sanguinis hominis could not be detected. The patient's temperature was normal. Sexual power was completely lost. Examination of the urine negative.

The patient was etherized and an incision made along the entire length of the dorsum of the penis, being about ten inches in length. The skin was found to be tough and fibrous, and, on division, a thick, white, elastic, fibrous tissue was exposed, it was impossible at first to identify either the corpus cavernosum or spongiosum. To guard against wounding the urethra a small-sized bougie was passed into the bladder. The tough fibrous tissue was then dissected entirely away from the penis, when a strong thick band was found passing along the entire length of the under surface of the organ, which was formerly attached to the central tendon of the perineum. On removing the fibrous mass from the vicinity of the base of the penis, the missing testicle was found pulled up out of place. It was dissected loose, and replaced in the scrotum. The hæmorrhage, which was not so profuse as had been expected, was easily controlled by means of hæmostatic forceps, and very few ligatures were required. After the operation an ordinary antiseptic dressing was applied, and the body of the penis allowed to granulate. The complete heal-

ing of the wound occupied four months, at the end of which time the patient had entirely recovered. On examination, after recovery, it was found that the newly formed skin was tightly adherent to the body of the organ which held the penis in a horizontal position. The patient stated that he was in perfect health and that sexual powers were completely restored.

A brief abstract from the interesting pathological report, made by Professor H. F. Harris, is herewith appended.

"On microscopic examination the epidermis covering the diseased area is found greatly thinned and the epithelial ridges are almost entirely destroyed. Here and there, however, thin rods of epithelium, which are evidently the remains of these ridges, project down for a short distance into the true skin; the cells of which these rods are composed contain much, almost black, pigment, and they do not react to either basic or acid aniline dyes. Just beneath the epidermis there are numerous rounded masses of more or less entirely keratinized epithelial cells. They are sometimes in contact with the epidermis, but more generally seem to be quite free in the derma proper, without any connection with the epithelial layer. While the cells of which they are composed are in most instances keratinized, in some cases the cells which form the outer boundaries of the masses still preserve the morphologic and staining peculiarities of the younger cells, sometimes those cells are piled upon each other several deep. The epithelial cells of the epidermis, as a rule, preserve their normal size, shape, and general relation to each other, but they do not stain as readily as normal cells. In addition to this, many cells in the prickly layer are swollen to twice the normal size. The protoplasm of these cells is homogenous and takes acid stains faintly, the nuclei stain feebly or not at all. Occasionally a leucocyte can be seen between the cells. The layers of cells which form the deeper portions of the Malpighian layer are almost black from the presence of a dark-brown pigment; the pigment is so dense that the peculiarities of the cells in this situation cannot be made out with certainty.

"The greater part of the tissue is evidently from that part of the penis upon which no hairs occur, but in sections from one of the pieces a few were observed. No changes in the shaft could be made out. The cells of the inner cells of the outer root-sheath

are plainly in a state of degeneration; their nuclei stain faintly or not at all, and their protoplasm is faintly colored by the acid dyes. Even the outer cells of the outer root-sheath are elongated and their nuclei are very irregular in form. The cells of the sebaceous glands present more nearly a normal appearance than any of the other epithelial structures, but they are in many cases elongated and take stains poorly.

"Sweat-glands are only occasionally found. The coils are often separated from each other by dense masses of cells. These cells will be referred to later.

"The true skin is enormously hypertrophied. This is principally due to an increase in the amount of collagenous tissue, but not in an inconsiderable degree to the presence of collections of cells around the blood-vessels of this tissue. The collagenous tissue occurs in thick bundles which are almost invariably disposed in planes parallel to the skin surface. In the deeper portions of the skin wall defined fibrils of elastic tissue are often found; they are in general run from the deeper layers of the skin towards the surface. At intervals through the tissue comparatively large, robust bundles of involuntary muscle fibres occur. They are not probably of a new formation, but result from the hypertrophy of the pre-existing muscle of the parts. In the true skin, extending downward for a considerable distance, there are numerous small, very dark pigment masses, generally of a rounded or irregular form. These granules may be seen in the process of formation from the lower layer of the epidermis.

"The blood-vessels are comparatively scant, but those which are present present interesting changes. Contrary to the observations of others, I have found the changes in the arteries much more pronounced than those in the veins. The alterations in the latter consist principally in a marked dilatation of their calibre; in addition to the endothelial cells lining their inner coats shows a marked decrease in their power of taking stains, and in some cases they do not stain at all. Rarely the outer coats of these vessels show marked thickening, and in almost every instance are more markedly cellular than normal. The arteries are all small, and very frequently their lumen is encroached upon by thickening of their walls, and in these instances the intimas are represented by a structureless hyaline membrane which takes the acid stain. The muscular coats are rarely so stained that their true nature can

be recognized. Replacing the muscular coat in many of the vessels are collections of cells which have the appearance of lymphoid cells; sometimes these masses of cells exactly occupy the muscular area, but in other cases they encroach upon the intima and push it inward. The adventitiæ of the vessels are in most instances decidely thickened, and contain lymphoid and plasma cells. The entire walls of some of the vessels are hyaline; here the intimæ are generally swollen. Occupying the lumina of some of the arteries are yellow, entirely homogeneous masses which take acid stains, but no basic ones, and would appear to be hyaline thrombi. None of these were seen in vessels whose walls were hyaline, but were frequently observed in those the muscular walls of which were infiltrated with cells.

"The perivascular lymphatics are almost always greatly dilated and contain collections of lymphoid and plasma cells; within these collections of cells, usually near their edges, mast-cells frequently occur, but no pyonuclear leucocytes were found.

"Between the bundles of collagenous tissue, and having no apparent connection with the lymphatics of the blood-vessels, are often collections of cells which in every way resemble those just spoken of; whether they are only a part of these masses cut so as not to show the vessels or entirely separate could not be determined. Scattered through the tissue generally plasma, lymphoid, and mast-cells are of frequent occurrence. The tissues are abundantly supplied with characteristically branched connective-tissue cells. None of the cells mentioned are elongated or twisted, as would be supposed to be the case had they been subjected to considerable pressure. A careful study of the section failed to reveal the presence of micro-organisms.

"Attempts to study the nerves of the tissue by Golgi's silver method were unsuccessful, as, is often the case, impregnation did not occur."

(The photographs of these interesting cases were kindly taken for me by Professor Henry W. Stelwagon.)

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 5, 1898.

The President, J. EWING MEARS, M.D., in the Chair.

EXSTROPHY OF THE BLADDER, PUBIC BONES ABSENT.

DR. DE FOREST WILLARD presented a child, five years of age, who had come under his care on account of complete absence of abdominal and anterior vesical wall, with protrusion of the posterior wall of the bladder. (Fig. 1.) This protruding membrane was deep crimson red, and bled easily upon slight traumatism. The upper margin of the area was a thin bluish-white cicatricial tissue, which cicatrix probably included the umbilicus, as no distinguishable navel was present. The urine appeared to trickle intermittently through three ureteral orifices instead of two; the third point being about one-fourth of an inch above the ordinary right orifice. A distorted, flattened, clubbed epispadic penis was attached below the lower margin of the opening. The scrotum was normal but small; both testicles had descended through the external abdominal rings, but had not reached the bottom of the scrotum.

There was a readily palpated cleft or division of the pubes, but no movement of the pelvic bones. The skiagraph (Fig. 3) shows a deficiency of the pubis fully two inches wide.

The child was otherwise perfect; of good size, well nourished, but was, of course, constantly saturated with urine.

An operation for the relief of this condition was done as follows:

An inverted U-shaped flap was cut from the abdominal wall, beginning from a little outside of the upper right angle of the opening, passing upward as high as the epigastric region,

FIG. 1. – Case of exstrophy of the bladder, with absence of pubic bones; condition previous to operation.

FIG. 2.—Case of exstrophy of the bladder; after plastic operation for its relief.

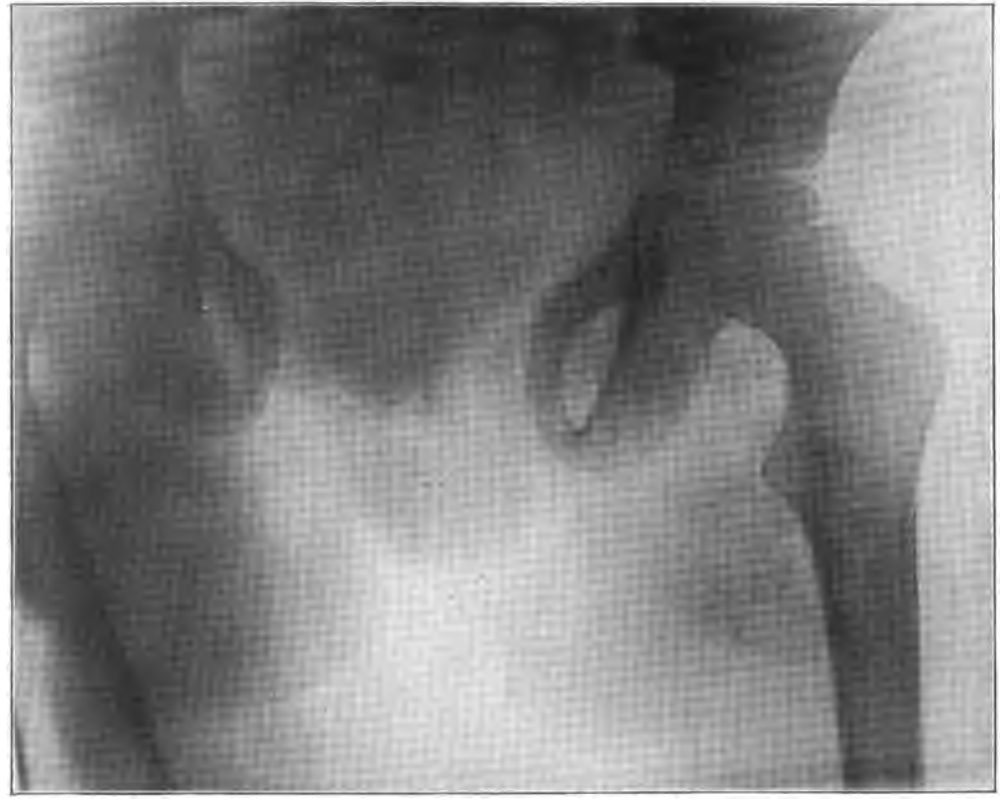

FIG. 3.—Skiagraph showing separation of the pubic bones in case of exstrophy of the bladder.

at which point its flattened apex was cut one-fourth greater than the lateral diameter of the opening, to allow for shrinkage, thence downward, and ending at the outside of the left upper angle. This flap was made very large, so that after it was folded upon itself at its base, with skin surface inward, it might lie over the entire exposed bladder area easily, and require no tension upon the stitches to retain it in place.

A deep undercutting incision was now made around the entire lateral and lower aspects of the opening, except only the central lower portion opposite the median portion of the penis, which area was left as a urethral orifice. This incision extended through healthy skin and fat, and was one-quarter of an inch outside the red margin of the abdominal opening. Into this crevice was tucked the reverted abdominal flap with its raw surface outward.

Fine chromicized catgut stitches were inserted at numerous points, so as to bring the flap in close apposition with the marginal cut. These stitches included the fat and connective tissue of the flap, and caught the under layer of the derm, but did not extend through the epidermis, either in the reverted flap or in the skin surfaces of the abdomen in the marginal incision.

By this process both skin edges were slightly inverted, and the raw surfaces were brought absolutely into apposition, while the fat and connective tissue of the reverted flap lay in apposition, with the fat and connective tissue and skin upon the outer margin of the gaping cleft made by the circumferential incision. As a reinforcement to these sutures, a continued suture was applied secondarily, completely encircling the flap, and turning in more raw tissue in the same manner as a reinforcement stitch in intestinal work. The base of the flap being left as broad as possible, made cornua at the upper angles, which were strongly stitched.

The wide gaping wound made by turning down the flap from the upper abdomen was easily drawn together, even without much undercutting.

The raw face of the reverted flap was next covered by two lateral flaps cut from the skin and subcutaneous connective tissue in the abdominal portion of the pubis and groins, care being taken to avoid the testicles which lay outside of the external rings. These two flaps were placed with their raw surfaces inward, in apposition with the already existing raw flap surface,

and were sutured together at the median line. At their upper and outer aspects they were stitched to the abdominal skin, giving the appearance as shown in the cut. (Fig. 2.) There remained only a small opening for the escape of urine just above the distorted penis at the bottom of the original opening. Into this opening was inserted a soft drainage-tube, which lay along the groove in the upper surface of the epispadic penis.

Sterilized gauze, wet with one-eighth of 1-per-cent. solution of formalin, was kept over the wound, and renewed as often as soiled with urine.

The wounds, constantly soaked with urine, healed slowly, but at no time was there any leakage through the stitch-holes. The drainage-tube was removed after a few days. Union occurred throughout the entire area, even at points where, for the first week, gray patches threatened its safety.

At the present time the opening for exit of the urine, at the base of the penis, is narrowed to one-fourth of an inch in diameter. Further attempts will be made to construct an urethral tube along the upper surface of the penis; should this be secured, a third operation, having for its object the closure of the small aperture at the base of the penis, and the connection of the new bladder to the new urethra will be undertaken. If successful, it will bring the outlet of this reservoir at the tip of the penis.

Two attempts have already been made, but have failed. In the first one, the gutter along the dorsum was deepened by an incision, into which gutter was turned a long, slender flap of preputial skin in order to prevent readhesion. Large flaps were then raised from either side of the penis, and their raw surfaces brought together at the median line by shotted quill suture. Union failed to take place, but the preputial flap, turned in to prevent the reunion of the sides of the deepened gutter, lived.

Two months later another plan was adopted: two longitudinal surfaces, each one-fourth of an inch in width, were denuded along the dorsum of the penis, leaving a central strip of skin tissue in the centre as an urethral floor. Across these raw surfaces was then turned a large flap, cut from the prepuce and lateral skin of the penis, and stitched with its raw face inward along the edges of the bared area. As this distance was less than one-half inch in length, the stitches could be inserted on

both sides. This also failed, but a third attempt will be made as soon as the condition of the tissues will permit.

It is wise never to sacrifice the prepuce until the completion of all operative procedures for this difficulty, since it is often most useful in supplying needed tissue. After final success is attained, the prepuce may be pruned as desirable for cosmetic purposes. The natural tendency of the flattened clubbed penis to assume its original condition makes too much tension upon the flaps if any attempt is made to draw its sides together.

A few words in relation to the question of the formation of a urinary receptacle, or an artificial bladder. Necessarily such a constructed bladder does not yield the results of a muscular contractile organ, and it seems hardly possible that a contractile cavity can be secured. The object of the procedure is rather to secure a receptacle in which the urine may be temporarily stored, from which it can be drained through a narrow orifice into a rubber vessel to be worn constantly upon the person. The special variety of urinal is a question of mechanical adaptation. The skin in such a constructed bladder retains its hair-bulbs, and in cases where capillary growth occurs, it becomes the centre of deposit for urinary salts. Many attempts have been made to secure another route for the ureters, principally transplantation into the rectum or perineum. The latter point, however, does not offer a much more favorable area for the adaptation of a urinal than does the abdomen, save as gravity assists.

The operative closure of the bony pubic cleft, either by the separation of the sacro-iliac articulation, as advised by Trendelenburg, with direct suturing and closure of the soft parts, does not fulfil the indications, and the wounds are specially liable to infection from constant saturation of urine. A new bladder constructed only from the posterior wall surface would be an exceedingly small one. The risks of infection would not seem much greater if the existing posterior wall mucous membrane were dissected free from its circumference, and its freed edges united to form a pouch, without disturbance of the bony structures. Should the peritoneal cavity be opened by this procedure at the thin margin, it could be sutured. The strength of the anterior wall could be fortified by turning in lateral flaps, raw surfaces inward.

The operation of König—osteotomy of the pubic rami—is

open to the same objection of wound infection as is that of sacro-iliac section. The sides of the pelvis, after either of these operations, must necessarily be brought together with considerable force, and the resultant injury to the pelvis in a female would be unjustifiable.

Transplantation of the ureters has for many years been a favorite procedure, the rectum being naturally the receptacle adopted, as the vagina offers but little power of retention. Many experimenters have proved that the rectum resents the urine, but the chief ultimate danger is the infection of the kidneys through the ureters. Recently attempts have been made to improve the technique of the operation, in order to prevent this most serious result. Maydl, Fowler, and others have succeeded to a moderate degree, but many years must elapse before the success of the procedure can be determined. Maydl's plan, which endeavors to retain nature's method of vesical valve-opening of the ureters, consists in transplanting the whole bas fond, together with its ureters, into the rectum bodily.

Other operations, as that of Bignoni, aim to provide a V-shaped valve cut from the anterior wall of the bowel, so that the orifices may be covered by little folds. Fowler very properly criticises Maydl's operation by calling attention to the fact that the conditions in the rectum, even after union is secured, are entirely different from the water-pressure valve as exerted in the bladder upon the lower ends of the ureters. Pisani's operation, of carrying the ureters across the calibre of the rectum and inserting them into the posterior wall, seems to offer no advantage, but, on the contrary, many defects.

Fowler (*American Journal of the Medical Sciences*, March, 1898) has proposed an ingenious method, but whether it will be practicable remains to be determined by experience. With the patient in the Trendelenburg position, he opened the abdomen, secured the ureters at their entrance into the bladder wall, and cut them off obliquely. A longitudinal incision was then made into the anterior wall of the rectum, through serous and muscular coats only; these layers being dissected aside, and retracted by stitches, a diamond-shaped area of submucous tissue was exposed. A tongue-shaped flap, base upward, was then cut through the mucous membrane, opening the calibre of the rectum, which had been previously cleansed. This tongue-flap was then

doubled upon itself so that one-half of its mucous surface presented anteriorly, in which position it was secured by catgut sutures, thus securing a flap-valve covered on both sides with mucous membrane. The ureters were then stitched in the incision with the obliquely cut ends lying upon the presenting mucous membrane surface of the flap, care being taken not to invade the lumen of the ureters with the catgut stitches. The flap-valve, together with the attached ureters, was then pushed into the cavity of the rectum, the wound being closed in such manner as to maintain this flap free within the bowel. The ureters in this closure were made to pass obliquely for a considerable distance in the wall of the bowel, so that the subsequent muscular constriction of the tube would assist in the prevention of infection.

This operation was done more than two years ago, with the result that the rectum would retain the urine for three hours or longer, and that urination and defecation took place independently, the latter occurring only once daily, a fact that would seem to indicate that the sigmoid flexure, or the upper portion of the rectum, as has been otherwise observed, is the ordinary receptacle of fæces. The child, at the time of the report, had not shown evidences of renal disturbance, but the period is too short to determine definite results.

The boy presented for examination by Dr. Willard showed a firm abdominal cicatrix, with a bladder capable of containing several ounces of urine, but there was no control of the flow from the basal opening, save as the stunted penis acted as a sort of valve. Should further attempts at construction of a urethra fail, the application of a truss or pad to this distorted penis might possibly be effectual in converting it into a pad or cork that would close the small existing opening, and permit the boy to empty his bladder at stated intervals, and thus be saved from the misery of constant dribbling.

As he will be entirely incapable of procreation, the question of castration will be considered later, as an element in the prevention of the moral degradation which so often characterizes this class of cases.

CLOSURE OF PERFORATING TYPHOID ULCER.

DR. DE FOREST WILLARD reported the following case:

A Massachusetts soldier was admitted to the Presbyterian Hospital October 30, 1898, under the care of Dr. Musser, with a history of sickness of five days' duration, accompanied by nose-bleed, etc. Temperature 104° F. Frequent baths were given, reducing the temperature to 99°, with variations, the highest point attained being 104⅘°. Marked distention of abdomen by tympany developed. On the thirteenth day a small hæmorrhage from the bowels occurred, followed by depression of temperature to 99°. On the fifteenth day, at 11 A.M., sharp pain to the right of umbilicus was complained of, followed by rapid weakening of heart-power, dyspnœa, cold sweat, etc. Two hours later the pain in the abdomen was of moderate degree, but persistent. Muscles resistive rather than rigid; this resistance slightly in excess on the right half of abdomen; had vomited once, and was retching occasionally; had just passed a small amount of thin yellow fæces, *without blood*. The abdomen was moderately distended and tympanitic; line of resonance between liver and diaphragm. Temperature 98°, pulse 150, small, feeble, and thready. Voice also feeble.

The question of diagnosis between fresh hæmorrhage and perforation seemed to favor the latter hypothesis. Pain, depression, etc., might follow either accident, but the absence of any blood in the stool, two and one-half hours after the onset, together with the presence of resonance above the liver, were in favor of perforation.

Immediate operation was advised, but during the removal of the man to the operating-room, and the preparation incident thereto, most marked failure in heart volume and in respiration were apparent, and when the operation was commenced the patient was almost *in extremis*. An attempt to save his life, however, seemed justifiable. A rapid incision was made along the right semilunar line. A large amount of greenish-yellow, ill-smelling serum and fæces flowed through the wound. The deeply congested ileum was drawn out, and followed downward towards the right iliac fossa, the most probable point of perforation. Several thin ulcerated portions were passed, but in a few seconds a point four inches above the ileo-cæcal valve was reached from

an opening in which, of size just sufficient to admit a grooved director, oozed yellowish fæcal contents. About this area already were indications of lymph exudation.

Interrupted Lembert silk sutures were introduced, inverting longitudinally the perforation. The extreme thinness of the intestinal walls, with the irregular induration, showed a large ulceration.

A secondary, fortifying, continuous suture was inserted. No other perforations existing above the ileo-cæcal valve, the abdomen was thoroughly flushed with large amounts of hot sterilized water, which, together with the use of oxygen, assisted in partially reviving the patient.

His condition had been throughout the operation most desperate, necessitating rapid work, and absolutely prohibiting the question of evisceration and dry sponging of lymph. A large glass drainage-tube was inserted, and the wound closed. Patient was kept alive by the administration of oxygen, but he died almost immediately after the completion of the dressings. The attempt to save him and the prompt securing of the perforation, within a few minutes after making the incision, rendered the proceeding, however, thoroughly justifiable, although the rapid collapse previous to the operation indicated a positive and speedy death.

The subsequent examination showed that the point had been firmly closed, and had the patient's condition been more favorable, might readily have resulted in saving his life. The intestine showed numerous points of deep ulceration; at the point of perforation a large, ragged, deeply excavated ulceration existed, of irregular shape, at least an inch in diameter. The appendix was normal.

Dr. J. Ewing Mears said that, ten years since, he read a paper at a meeting of the American Surgical Association in Washington, in which, so far as he was able, he collated the number of cases in which cœliotomy had been performed for perforating typhoid ulcer. The cases were four in number, and, in chronological order, were those of Professor Kussmaul, of Strasburg, Mr. T. H. Bartleet, of Birmingham, England, Dr. R. B. Bontecou, of Troy, N. Y., and Dr. T. G. Morton, of Philadelphia. All of these cases were fatal. The conclusions presented in the paper were as follows: First, surgical interference should not be instituted in cases of typhoid fever, in which perforation occurs

when the infective process is at its height. Second, in mild cases of the disease, in which the pyrexia has not been of high grade, and in which perforation occurs at the end of three weeks or later, when the stage of convalescence is fully pronounced, cœliotomy may be performed. Surgical interference, in cases of this character, is advocated with the hope that, if the method suggested by Lucke—cœliotomy with the formation of an artificial anus—be adhered to, success may be accomplished. Third, rapidity in operation would be an essential factor in the achievement of success, through which prolonged exposure of the cavity will be avoided and shock greatly lessened. The perforations having been closed or an artificial anus having been formed, hot antiseptic solutions should be poured in sufficient quantity into the cavity, a glass drainage-tube carried to the floor of the pelvic cavity, and the wound closed. Prolonged "toilet" of the peritoneal cavity, as is generally understood, should not be made while the cavity is opened. Irrigation through the drainage-tube should be made as soon as the cavity is closed, and should be repeated at such intervals as the surgeon may deem proper. Should the patient survive, relief from the artificial anus can be obtained by operation.

DR. WILLIAM J. TAYLOR remarked that in Dr. W. W. Keen's book, on the "Surgical Complications and Sequelæ of Typhoid Fever," there are a number of cases recorded of recoveries after operations. All of these were operated upon within twenty-six hours after the perforation was supposed to have occurred, and nearly all were operated upon within a few hours. No cases recovered that were operated on later than twenty-six hours.

DR. WILLARD said that, of course, the number of recoveries in operative cases following perforation must necessarily be small, because the condition before the operation is generally a desperate one, and most cases are seen when *in extremis*. If the operation is performed within twenty-four hours the percentage of cures will be increased; after twenty-four hours interference seems almost hopeless. This man was operated on between five and six hours after the perforation, and he was dying at the time, —it was only a desperate attempt to save him.

As to the length of time required to find the perforation he made the right lateral incision purposely, so that he could reach

the point of perforation in the quickest possible time. He did not think it was more than two or three minutes after the abdomen was opened before the perforation was found. He struck the ileum about twelve inches above the ileo-cæcal valve, and the perforation was four inches above. He only had eight inches of the ileum to run over, stopping to investigate two or three points of ulceration before this perforation was found. The sutures were inserted and the perforation closed as quickly as possible.

In regard to flushing or the toilet of the abdomen, the time consumed would be just about the same in suturing, or excision, or the formation of an artificial anus, so that the question of time would not enter very seriously as regards to the method.

As to the question of excision of the ulcer. The man was in a desperate condition, as are nearly all these cases. In this case the intestinal wall was exceedingly thin, and in placing the stitches he felt that he was going as closely to the ulcerated mucous membrane as it was possible, and yet only one stitch out of seven or eight interrupted sutures tore out or had to be reinserted. He whipped a continuous suture outside of the first row to roll in more of the bowel and invert this ulcer still farther into the lumen. After the operation all of them were found to be firmly placed, as is shown in the specimens, the ulceration itself dipped there far into the lumen of the bowel.

PENETRATING WOUNDS OF THE THORAX.

Dr. Robert N. Downs, Jr., presented a man, thirty-nine years of age, who, on the evening of October 18, 1898, was brought to the Pennsylvania Hospital, suffering with three stab-wounds of the chest, all on the left side. The upper one was situated in the posterior axillary line, in the eighth interspace, on a level with the nipple. The direction of the thrust was apparently directly inward, as the finger carried in revealed wounded pleura and lung tissue at the same level. The lower wound, from which a piece of omentum was protruding, was located in the ninth interspace and midaxillary line, two inches to the right and six inches below the upper wound.

In addition, there was present a non-penetrating wound, one inch below and behind the upper.

The man was quite shocked on admission. Temperature,

96° F.; pulse, soft and rapid; countenance pale and surface sweaty. There was, however, but slight external oozing from the wounds, although each respiratory effort was accompanied by rushing of air in and out through the openings.

The abdomen was distended, tense, and dull, especially in the flanks. Dr. R. G. Le Conte saw the case almost immediately, and decided upon operation. The patient was etherized, and an incision made in the median line of the abdomen, above the umbilicus. Upon opening the peritoneum a large quantity of blood, liquid and clotted, escaped. A small portion of bleeding omentum was ligated and excised, and the abdominal cavity flushed out, rapidly filling, however, with blood.

Search for the source of hæmorrhage now revealed a rent of considerable extent in the left segment of the diaphragm, through which the blood was escaping from the thoracic into the abdominal cavity. At this point the patient's condition became so alarming that three quarts of salt solution were quickly transfused into the median basilic vein, and the abdominal incision was closed. An attempt was now made to insert gauze packing into the lower chest wound with hope of controlling bleeding. This was followed by free hæmorrhage through packing and at the same time expectoration of frothy blood, the pack was withdrawn and a fenestrated rubber drainage-tube was then inserted at the upper and brought out at the lower wound where it was secured. Atmospheric air was now rushing into the pleural cavity with each inspiration, and at the same time a large quantity of blood was escaping through the tube. A large antiseptic dressing was now applied and the patient was put to bed. His condition after operation, though precarious, was even better than on admission. Eight hours after operation, though the primary dressing was saturated with blood and some oozing still persisted, his condition was fair. Pulse rapid but of good volume and temperature 100° F. No further hæmoptysis occurred, but some dyspnœa was experienced.

The drainage-tube was removed on the third day after operation, the hæmorrhagic oozing having almost ceased. In the mean time he had steadily improved. Free bowel movement had been secured, and no symptoms of peritonitis had developed.

From this time on, with the exception of a mild purulent pleurisy, developed ten days after operation, accompanied by rise

of temperature and free discharge from chest wounds, his convalescence was unnoteworthy.

Examination of the chest, at the time of presentation, revealed a dulness on percussion over base of left chest behind, less marked when patient turned on his side, accompanied by diminished tactile fremitus and distant breath-sounds.

Dr. Downs also presented a second patient, a colored man, thirty-five years of age, who, on the same day that the first case was admitted, was brought into the receiving ward, suffering with a penetrating stab-wound of the chest, inflicted with a pocket-knife. The blade had severed the costal cartilage of the fourth rib, on the right side, about three-fourths of an inch to the right of its sternal attachment, passing thence into the pleural cavity. The section made by the weapon in passing through the cartilage was complete, and transverse in direction, quite similar in appearance to the wound caused by the costotome when removing a sternum during post-mortem examination.

There existed in addition a punctured wound in the deltoid region of the left arm.

When seen, shortly after admission, the patient was in a condition of collapse. Countenance pale and voice husky. Pulse weak and rapid, extremities pinched and cold, with sub-normal temperature; and in addition, considerable nausea and vomiting. There was, however, no hæmoptysis, and but slight external oozing from the chest wound. On physical examination, as in the first case, atmospheric air could be heard passing into chest with each respiratory effort, and blood also could be seen welling up. The right side, especially on the posterior aspect, was very dull on percussion, with absent breath-sounds. When seen by the chief of the service, Dr. T. G. Morton, his condition was such that any operative procedure was deemed unadvisable. The patient was accordingly placed in the ward, having made his ante-mortem statement before a magistrate, and treated with free stimulation and opium in moderation. His external wounds were closed with catgut and dressed with sterilized gauze.

Twenty-four hours after admission his voice had become more natural, his pulse was comparatively faint but of good volume, temperature slightly elevated, extremities warm and not shrivelled at tips. No further nausea and no external oozing. He complained of soreness in his chest and difficulty in breathing.

In the succeeding forty-eight hours the dyspnœa disappeared, and the patient's general condition was much improved.

He was permitted to be out of bed thirteen days after admission, at which time, though feeling fairly well, the percussion dulness still persisted on the right side, less marked, however, on the anterior aspect. He was discharged from the hospital on the 21st of November.

Physical examination at the present time reveals a dull percussion-note over right posterior chest, amounting to flatness at the base, accompanied by greatly diminished tactile fremitus and weak breath-sounds, which at the base are inaudible.

DR. ROBERT LE CONTE remarked that when a knife or any other sharp instrument penetrates the pleura and wounds the lung, the hæmorrhage is generally profuse, and frequently alarming. The bleeding may take place from the lung, from an intercostal or internal mammary artery, or from both. He had never been able to demonstrate that the intercostal artery was cut. He had never seen it spurt, and he should infer from its protection by the lower border of the rib that it is not often injured, unless the rib also shows marks of violence. The small branch that runs along the upper border of the rib is too insignificant to be of much consequence. That great and alarming hæmorrhage can take place from the lung is well illustrated in a case reported by Dr. J. Chalmers Da Costa a year ago before this society. To be sure, in that case the hæmorrhage was a secondary one; but if it can occur as a secondary result, why not also as a primary one. Hæmorrhage from the lung, as seen by him, is characterized by very dark, almost black, blood. This must be due to a wounding of the branches of the pulmonary artery, the darkest blood in the body, and the escape of the blood before it has a chance to be acted upon by the air. If, however, the blood has collected in the pleura, and been exposed to the air for a short time on account of a pneumothorax, it will be considerably lighter in color. Also, as seen on the dressings, it will present a normal hue, but as it comes from the lung it is darker than ordinary venous blood. Hæmoptysis may or may not be present. In the few cases he had seen it had been absent certainly half the time. When present, the blood is bright in color, as it has had a chance to be well aërated on its passage through the bronchi.

If there is profuse bleeding from a penetrating stab-wound of the chest, and no indications that an intercostal artery has been severed, and the locality of the wound eliminates injury of the internal mammary, one must infer that the hæmorrhage is from the lung itself. In dealing with it some advise the immediate closure of the external wound by suture or a plug of gauze, others the insertion of a drainage-tube with free drainage, and some text-books give both procedures, but do not state why you should use one in preference to the other.

When plugging or immediate suture of the external wound is resorted to, strapping of the chest is also recommended, with the application of cold and the administration of drugs, like ergot, sulphuric acid, etc. The object of closing the wound is to dam up the blood in the pleural cavity, and so, by its mechanical pressure on the lung, stop the hæmorrhage. That many cases have recovered under this line of procedure is well known; but does the hæmorrhage cease on account of this intrapleural pressure? He would answer no. In the first place, the pressure in a lung on forced inspiration is equivalent to about thirty millimetres of mercury, and at expiration its pressure is a negative one of from six to ten millimetres of mercury,—in other words, the tendency for the elastic tissue of the lung to still further contract at expiration is equivalent to from six to ten millimetres of mercury. By strapping the chest one endeavors to prevent the respiratory muscles from acting and to keep the lung in a position of expiration, one in which the intrapleural pressure is negative instead of positive. To be sure, the capacity of the chest is diminished, but it will still be large enough to hold a quart or two of blood before any very considerable pressure will be exerted on the lung. Secondly, when blood is poured into the pleura and the air is excluded, there is little or no tendency for it to clot, and it frequently remains fluid for days or even weeks. Therefore the chances of the cut vessels closing by clot are materially decreased. Thirdly, as the mechanical pressure from the effused blood increases and forces the lung back against its root, it must materially affect the circulation of blood through the lung, and so engorge the right side of the heart and raise the blood-pressure. Therefore, as the mechanical pressure increases the blood-pressure rises also, and, the severed vessels remaining patulous, the gain from the outside pressure is in a measure over-

come by the increased pressure within the vessels. He said in a measure, for the loss of blood would tend to decrease the blood-pressure. By the application of ice to the chest only a very slight effect can be exerted on the lung, and the exhibition of drugs he believed to be useless, and of ergot to be rather harmful. Now when such a case recovers, he does so with a pleura filled with blood. If the blood remains fluid it may be easily aspirated and no harm result. But if clotting takes place before aspiration is tried, a rather formidable operation would be required to remove the clots, and if they are allowed to remain, organization will take place, the pleural cavity will be obliterated, and the lung tightly glued to the chest wall: a condition which certainly impairs the usefulness of the organ and renders it more vulnerable to disease.

In a case in which a bronchus has been opened in addition to a severing of the vessels of the lung, and in which the external wound has been sealed, the hæmorrhage will be much more rapidly controlled, owing to the mechanical pressure of the pneumothorax on the lung, and the blood will readily clot in the presence of the air; an ideal condition for the rapid control of hæmorrhage. But the patient is subjected to the risk of having this mass of blood-clot infected through the opened bronchus, and changing a hæmothorax into a pyothorax. This risk is a very serious one, and one not to be incurred with the hope and a prayer that infection will not take place. Also by closing the external wound the chances of a general emphysema taking place are vastly increased, a complication which is annoying and may be serious.

In cases where a drainage-tube is inserted into the pleural cavity and free drainage established, the pleura is immediately filled with air, and the muscles of respiration are prevented from acting on the lung, allowing the lung to contract by its own elastic tissue as well as by the pressure exerted by the pneumothorax, and at the same time the presence of the air favors clotting in the severed vessels. In his limited experience this simple procedure had been quite sufficient to stop the hæmorrhage. In addition, the drainage has cleared the pleura of blood, and if any infecting material has been carried in, it has reduced its dangers to the minimum. It has been objected that the drainage-tube is itself a menace to the sterility of the wound, but in these

days of asepsis the dangers of infection from this source are very slight. However, if it does occur, it will be limited to the immediate neighborhood of the wound, and cannot be a complication of much seriousness. Another objection, and one of more weight, is the danger from a large and rapidly formed pneumothorax. Quénu, of Paris, experimented on a dozen dogs to find out just what the dangers are in a quickly formed pneumothorax. He states that when a healthy pleura (one without adhesions) is freely opened, the symptoms of heart-failure will be rapid, labored breathings were always present and very alarming, and in one or two instances were sufficient to cause the death of the dog. If the animal did not die, the dangerous symptoms slowly disappeared. Death was undoubtedly due to the sudden engorgement of the right side of the heart, and the dog lost his life because he was strong and full-blooded, and the sudden rise in blood-pressure was sufficient to overcome the heart. Would this objection seriously apply in a man who has lost much blood? He thought not, but if it did, it could readily be controlled by venesection. Further, he could conceive of its being of positive benefit, where the hæmorrhage has been very great and the blood-pressure reduced to its lowest ebb, as a quick and ready means of raising the pressure and tiding the case over until salt solution can be injected into a vein.

If drainage and the admission of air to the pleural sac does not control the hæmorrhage as a last resort, the wound in the lung must be packed or sutured, or the bleeding vessels ligated. This will require the resection of one or more ribs, as a lung cannot be packed unless grasped and held.

Referring to the first case reported by Dr. Downs, his condition was very serious, and he showed the effects of having had great hæmorrhage, yet but little blood was coming from the chest wounds. The lower wound was plugged with omentum, and the blood from the lung was pouring into the abdominal cavity through the cut diaphragm. While searching the abdominal organs for an injury, his pulse rapidly failed, and not finding anything to account for the hæmorrhage, the abdomen was quickly closed and the lung wounds investigated. The hæmorrhage now was very profuse from the pleural cavity, and he was strongly tempted to resect one or two ribs and pack or suture the lung to control it, but he felt death must follow any pro-

longing of the operation, and that the man's best chances of recovery lay in drainage.

DR. DE FOREST WILLARD said that the objections that Dr. Le Conte had urged in regard to closure of the external wound in these cases were certainly valid. Simple closure of the external wound in order to arrest a hæmorrhage, which is separated a considerable distance from this wound, across the pleural cavity which will contain a quart of fluid, certainly does seem a very uncertain procedure. He had, however, been largely influenced against the method of free opening of the chest by a series of experiments which he undertook some years ago on dogs for pneumotomy and pneumectomy, and opening the bronchus for foreign bodies, etc., by the alarming and tremendous collapse of the dog that took place, whenever a free opening was made in the chest. The dyspnœa and the signs of impending death were regulated almost in exact proportion to the size of the opening. If the wound was closed absolutely, the dog began to breathe much easier, would recover again, and the operation could be proceeded with. If partially closed, and the opening was small, the dog improved; if it was left large, he was very apt to die and die speedily. It seemed that the size of the opening increased the amount of pressure upon the lung, interfered with the circulation through the pulmonary arteries and veins, and produced collapse. From these experiments he was led to the conviction that the safest plan was that of closure of the external wound, so far as the immediate results were concerned. In many of these cases, if the hæmorrhage is large, it is the immediate death that is to be averted. The secondary results, hæmothorax and pyothorax, must be met later by surgical measures; opening the chest, then, can be done with safety, as in a case of empyema. As noted in the late war, even perforating wounds of the lung—a very considerable number of them—recovered when no operative interference was instituted and when the wounds were simply closed. The thorax seems to be a cavity which bears blood fairly well. The hæmorrhage frequently does cease under this method of closure, and while the objections are valid, yet in practice the weight of testimony is in favor of the method of closure of the external wound.

DR. J. CHALMERS DA COSTA said that he had been very much struck with the argument that Dr. Le Conte had made

in favor of incision with the introduction of the drainage-tube. The views which he has reached as to the effect of intrapleural pressure are also the views which have been maintained with considerable force by Pagenstecher. A number of cases of wound of the lung have been scientifically studied of late, but there have not been enough cases to emphasize very clearly which treatment we should follow, closure or incision and drainage. It is certain that a number of cases have recovered under both plans of treatment. Surgeons will not be able to determine these points until the records of a large number of cases can be brought together, records in which the general condition has been accurately outlined, and in which the subsequent treatment has been carefully pointed. out We need something in the nature of a collective investigation.

The problem, when should one attempt to suture a lung, is involved in still more obscurity. In the French Congress of Surgeons there was recently a debate upon this question, and great differences of opinion were noted. When one sees a man who seems certain to die without interference, a man in whom the line of hæmorrhage is rapidly rising, and in whom the symptoms of shock are rapidly increasing, he believed that, in spite of the peril which there may be in opening the chest, the common rule of surgery should be applied, an incision should be made, one or two ribs should be resected, and the hæmorrhage should be arrested. He could imagine no more serious harm that could come to a patient than to simply leave this hæmorrhage in the charge of nature.

In some cases bleeding may be arrested by ligature, in others by suture, in others by packing with gauze, in others by fixing the lung with gauze packing, as applying a gauze compress against the bleeding point.

DR. LE CONTE remarked that in his remarks he had in mind only severe hæmorrhage. He did not refer to small punctured wounds of the lung or wounds where the bleeding was not excessive, but to those cases where the hæmorrhage was large, where it was an immediate threat to the patient's life if not stopped. Unless resection of some ribs with packing or suturing of the wounded lung is resorted to, it seemed to him that the first object should be to get pressure on that lung. Air will do this as well as blood in the pleura: it will do it instantly in-

stead of waiting until a sufficient amount of blood has been poured out: it will permit the vessels to close by clots, while the other prevents it: and it will save to the patient the amount of blood necessary to exert mechanical pressure. These are the immediate benefits, and the remote ones are that there are eliminated the dangers of a pyothorax or of universal adhesions of the pleura. The danger of engorgement of the right side of the heart must be slight where the patient has lost much blood. Because it is great in a full-blooded dog is no reason why it should be so in an exsanguine man. The conditions are different, and the cases are not parallel.

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